APPENDIX B

AGING MANAGEMENT PROGRAMS AND ACTIVITIES

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B.0 INTRODUCTION

B.0.1 OVERVIEW

The aging management review results for the integrated plant assessment of James A. FitzPatrick Nuclear Power Plant (JAFNPP) are presented in Sections 3.1 through 3.6 of this application. The programs credited in the integrated plant assessment for managing aging effects are described in this appendix.

Each aging management program described in this appendix has ten elements in accordance with the guidance in NUREG-1800 (Reference B.2-1) Appendix A.1, "Aging Management Review – Generic," Table A.1-1, "Elements of an Aging Management Program for License Renewal." For aging management programs that are comparable to the programs described in Sections X and XI of NUREG-1801 (Reference B.2-2), *Generic Aging Lessons Learned (GALL) Report*, the ten elements have been compared to the elements of the NUREG-1801 program. For plant-specific programs which do not correlate with NUREG-1801, the ten elements are addressed in the program description.

B.0.2 FORMAT OF PRESENTATION

For those aging management programs that are comparable to the programs described in Sections X and XI of NUREG-1801, the program discussion is presented in the following format.

- **Program Description**: abstract of the overall program.
- **NUREG-1801 Consistency**: summary of the degree of consistency between the JAFNPP program and the corresponding NUREG-1801 program, when applicable (i.e., degree of similarity, etc.).
- **Exceptions to NUREG-1801**: exceptions to the NUREG-1801 program, including a justification for the exceptions (when applicable).
- **Enhancements**: future program enhancements with a proposed schedule for their completion (when applicable), including additional program features to manage aging effects not addressed by the NUREG-1801 program.
- **Operating Experience**: discussion of operating experience information specific to the program.
- **Conclusion**: statement of reasonable assurance that the program is effective, or will be effective, once implemented with necessary enhancements.

For plant-specific programs, the above format is generally applied with additional discussion of each of the ten elements.

B.0.3 CORRECTIVE ACTIONS, CONFIRMATION PROCESS AND ADMINISTRATIVE CONTROLS

Three attributes common to all aging management programs are corrective actions, confirmation process and administrative controls. Discussion of these attributes is presented below. Corrective actions have program-specific details which are included in the descriptions of the individual programs in this report, but further discussion of the confirmation process and administrative controls is not necessary and is not included in the descriptions of the individual programs.

Corrective Actions

JAFNPP quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. Conditions adverse to quality, such as failures, malfunctions, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause of the nonconformance is determined and that corrective action is taken to preclude recurrence. In addition, the root cause of the significant condition adverse to quality and the corrective action implemented are documented and reported to appropriate levels of management.

Confirmation Process

JAFNPP quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. The Entergy Quality Assurance Program applies to JAFNPP safety-related structures and components. Corrective actions and administrative (document) control for both safety-related and nonsafety-related structures and components are accomplished per the existing JAFNPP corrective action program and document control program. The confirmation process is part of the corrective action program and includes

- reviews to assure that proposed actions are adequate,
- tracking and reporting of open corrective actions, and
- review of corrective action effectiveness.

Any follow-up inspection required by the confirmation process is documented in accordance with the corrective action program. The corrective action program constitutes the confirmation process for aging management programs and activities. The JAFNPP confirmation process is consistent with NUREG-1801.

Administrative Controls

JAFNPP quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

The Entergy Quality Assurance Program applies to JAFNPP safety-related structures and components. Administrative (document) control for both safety-related and nonsafety-related structures and components is accomplished per the existing document control program. The JAFNPP administrative controls are consistent with NUREG-1801.

B.0.4 OPERATING EXPERIENCE

Operating experience for the programs and activities credited with managing the effects of aging was reviewed. The operating experience review included a review of corrective actions resulting in program enhancements. For inspection programs, reports of recent inspections, examinations, or tests were reviewed to determine if aging effects have been identified on applicable components. For monitoring programs, reports of sample results were reviewed to determine if parameters are being maintained as required by the program. Also, program owners contributed evidence of program success or weakness and identified applicable self-assessments, QA audits, peer evaluations, and NRC reviews.

B.0.5 AGING MANAGEMENT PROGRAMS

The following aging management programs are described in the sections listed of this appendix. Programs are identified as either existing or new. The programs are either comparable to programs described in NUREG-1801 or are plant-specific. The correlation between NUREG-1801 programs and JAFNPP programs is shown in Table B-2.

Table B-1
Aging Management Programs

Buried Piping and Tanks Inspection Program	B.1.1	new
BWR CRD Return Line Nozzle Program	B.1.2	existing
BWR Feedwater Nozzle Program	B.1.3	existing
BWR Penetrations Program	B.1.4	existing
BWR Stress Corrosion Cracking Program	B.1.5	existing
BWR Vessel ID Attachment Welds Program	B.1.6	existing
BWR Vessel Internals Program	B.1.7	existing
Containment Leak Rate Program	B.1.8	existing
Diesel Fuel Monitoring Program	B.1.9	existing

Table B-1
Aging Management Programs (Continued)

Environmental Qualification (EQ) of Electric Components Program	B.1.10	existing
External Surfaces Monitoring Program	B.1.11	existing
Fatigue Monitoring Program	B.1.12	existing
Fire Protection – Fire Protection Program	B.1.13.1	existing
Fire Protection – Fire Water System Program	B.1.13.2	existing
Flow-Accelerated Corrosion Program	B.1.14	existing
Heat Exchanger Monitoring Program	B.1.15	new
Inservice Inspection – Containment Inservice Inspection (CII) Program	B.1.16.1	existing
Inservice Inspection – Inservice Inspection (ISI) Program	B.1.16.2	existing
Metal-Enclosed Bus Inspection Program	B.1.17	new
Non-EQ Instrumentation Circuits Test Review Program	B.1.18	new
Non-EQ Insulated Cables and Connections Program	B.1.19	new
Oil Analysis Program	B.1.20	existing
One-Time Inspection Program	B.1.21	new
Periodic Surveillance and Preventive Maintenance Program	B.1.22	existing
Reactor Head Closure Studs Program	B.1.23	existing
Reactor Vessel Surveillance Program	B.1.24	existing
Selective Leaching Program	B.1.25	new
Service Water Integrity Program	B.1.26	existing

Table B-1
Aging Management Programs (Continued)

Structures Monitoring – Masonry Wall Program	B.1.27.1	existing
Structures Monitoring – Structures Monitoring Program	B.1.27.2	existing
Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program	B.1.28	new
Water Chemistry Control – Auxiliary Systems Program	B.1.29.1	existing
Water Chemistry Control – BWR Program	B.1.29.2	existing
Water Chemistry Control – Closed Cooling Water Program	B.1.29.3	existing
Bolting Integrity Program	B.1.30	existing

B.0.6 CORRELATION WITH NUREG-1801 AGING MANAGEMENT PROGRAMS

The correlation between NUREG-1801 programs and JAFNPP programs is shown below. For the JAFNPP programs, links to appropriate sections of this appendix are provided.

Table B-2
JAFNPP AMP Correlation with NUREG-1801 Programs

NUREG-1801 Number	NUREG-1801 Program	JAFNPP Program
X.E1	Environmental Qualification (EQ) of Electric Components	Environmental Qualification (EQ) of Electric Components Program [B.1.10]
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Fatigue Monitoring Program [B.1.12]
X.S1	Concrete Containment Tendon Prestress	Not applicable
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	See plant-specific Inservice Inspection – Inservice Inspection (ISI) Program [B.1.16.2]
XI.M2	Water Chemistry	Water Chemistry Control – BWR Program [B.1.29.2]
XI.M3	Reactor Head Closure Studs	Reactor Head Closure Studs Program [B.1.23]
XI.M4	BWR Vessel ID Attachment Welds	BWR Vessel ID Attachment Welds Program [B.1.6]
XI.M5	BWR Feedwater Nozzle	BWR Feedwater Nozzle Program [B.1.3]
XI.M6	BWR Control Rod Drive Return Line Nozzle	BWR CRD Return Line Nozzle Program [B.1.2]
XI.M7	BWR Stress Corrosion Cracking	BWR Stress Corrosion Cracking Program [B.1.5]
XI.M8	BWR Penetrations	BWR Penetrations Program [B.1.4]
XI.M9	BWR Vessel Internals	BWR Vessel Internals Program [B.1.7]

Table B-2
JAFNPP AMP Correlation with NUREG-1801 Programs (Continued)

NUREG-1801 Number	NUREG-1801 Program	JAFNPP Program
XI.M10	Boric Acid Corrosion	Not applicable
XI.M11	Nickel-Alloy Nozzles and Penetrations	Not applicable
XI.M11A	Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	Not applicable
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Not applicable
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS) Program [B.1.28]
XI.M14	Loose Part Monitoring	Not applicable
XI.M15	Neutron Noise Monitoring	Not applicable
XI.M16	PWR Vessel Internals	Not applicable
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion Program [B.1.14]
XI.M18	Bolting Integrity	Bolting Integrity [B.1.30]
XI.M19	Steam Generator Tube Integrity	Not applicable
XI.M20	Open-Cycle Cooling Water System	Service Water Integrity Program [B.1.26]
XI.M21	Closed-Cycle Cooling Water System	Water Chemistry Control – Closed Cooling Water Program [B.1.29.3]
XI.M22	Boraflex Monitoring	Not applicable

Table B-2
JAFNPP AMP Correlation with NUREG-1801 Programs (Continued)

NUREG-1801 Number	NUREG-1801 Program	JAFNPP Program
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Not applicable
XI.M24	Compressed Air Monitoring	Not applicable
XI.M25	BWR Reactor Water Cleanup System	Not applicable
XI.M26	Fire Protection	Fire Protection Program [B.1.13.1]
XI.M27	Fire Water System	Fire Water System Program [B.1.13.2]
XI.M28	Buried Piping and Tanks Surveillance	Not applicable
XI.M29	Aboveground Steel Tanks	Not applicable
XI.M30	Fuel Oil Chemistry	Diesel Fuel Monitoring Program [B.1.9]
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance Program [B.1.24]
XI.M32	One-Time Inspection	One-Time Inspection Program [B.1.21]
XI.M33	Selective Leaching of Materials	Selective Leaching Program [B.1.25]
XI.M34	Buried Piping and Tanks Inspection	Buried Piping and Tanks Inspection Program [B.1.1]
XI.M35	One-time Inspection of ASME Code Class 1 Small-Bore Piping	One-Time Inspection Program [B.1.21]
XI.M36	External Surfaces Monitoring	External Surfaces Monitoring Program [B.1.11]
XI.M37	Flux Thimble Tube Inspection	Not applicable

Table B-2
JAFNPP AMP Correlation with NUREG-1801 Programs (Continued)

NUREG-1801 Number	NUREG-1801 Program	JAFNPP Program
XI.M38	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Not applicable
XI.M39	Lubricating Oil Analysis	Oil Analysis Program [B.1.20]
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Non-EQ Insulated Cables and Connections Program [B.1.19]
XI.E2	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Non-EQ Instrumentation Circuits Test Review Program [B.1.18]
XI.E3	Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Not applicable
XI.E4	Metal Enclosed Bus	Metal-Enclosed Bus Inspection Program [B.1.17]
XI.E5	Fuse Holders	Not applicable
XI.E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Not applicable
XI.S1	ASME Section XI, Subsection IWE	See plant-specific Inservice Inspection – Containment Inservice Inspection (CII) Program [B.1.16.1]
XI.S2	ASME Section XI, Subsection IWL	Not applicable

Table B-2
JAFNPP AMP Correlation with NUREG-1801 Programs (Continued)

NUREG-1801 Number	NUREG-1801 Program	JAFNPP Program
XI.S3	ASME Section XI, Subsection IWF	See plant-specific Inservice Inspection – Inservice Inspection (ISI) Program [B.1.16.2]
XI.S4	10 CFR 50, Appendix J	Containment Leak Rate Program [B.1.8]
XI.S5	Masonry Wall Program	Structures Monitoring – Masonry Wall Program [B.1.27.1]
XI.S6	Structures Monitoring Program	Structures Monitoring – Structures Monitoring Program [B.1.27.2]
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Not applicable
XI.S8	Protective Coating Monitoring and Maintenance Program	Not applicable
Plant-Specific Programs		
NA	Plant-specific program	Heat Exchanger Monitoring Program [B.1.15]
NA	Plant-specific program	Inservice Inspection – Containment Inservice Inspection (CII) Program [B.1.16.1]
NA	Plant-specific program	Inservice Inspection – Inservice Inspection (ISI) Program [B.1.16.2]
NA	Plant-specific program	Periodic Surveillance and Preventive Maintenance Program [B.1.22]
NA	Plant-specific program	Water Chemistry Control – Auxiliary Systems Program [B.1.29.1]

JAFNPP programs have been compared to the NUREG-1801 programs with the results being shown in Table B-3 as

- programs consistent with NUREG-1801;
- programs with enhancements;
- programs with exception to NUREG-1801;
- not comparable to NUREG-1801 (plant-specific)

Table B-3
JAFNPP Program Consistency with NUREG-1801

Program Name	Plant Specific	NUREG-1801 Comparison		
		Consistent with NUREG-1801	Programs with Enhancements	Programs with Exceptions to NUREG-1801
Bolting Integrity			X	
Buried Piping and Tanks Inspection Program				X
BWR CRD Return Line Nozzle Program			X	X
BWR Feedwater Nozzle Program				X
BWR Penetrations Program				X
BWR Stress Corrosion Cracking Program				X
BWR Vessel ID Attachment Welds Program				X
BWR Vessel Internals Program				X
Containment Leak Rate Program		X		
Diesel Fuel Monitoring Program			X	X

Table B-3
JAFNPP Program Consistency with NUREG-1801 (Continued)

Program Name	Plant Specific	NUREG-1801 Comparison		
		Consistent with NUREG-1801	Programs with Enhancements	Programs with Exceptions to NUREG-1801
Environmental Qualification (EQ) of Electric Components Program		X		
External Surfaces Monitoring Program		X	X	
Fatigue Monitoring Program				X
Fire Protection – Fire Protection Program			X	
Fire Protection – Fire Water System Program			X	X
Flow-Accelerated Corrosion Program		X		
Heat Exchanger Monitoring Program	X			
Inservice Inspection – Containment Inservice Inspection (CII) Program	X			
Inservice Inspection – Inservice Inspection (ISI) Program	X			
Metal-Enclosed Bus Inspection Program				X
Non-EQ Instrumentation Circuits Test Review Program		X		

Table B-3
JAFNPP Program Consistency with NUREG-1801 (Continued)

Program Name	Plant Specific	NUREG-1801 Comparison		
		Consistent with NUREG-1801	Programs with Enhancements	Programs with Exceptions to NUREG-1801
Non-EQ Insulated Cables and Connections Program		X		
Oil Analysis Program			X	X
One-Time Inspection Program		X		
Periodic Surveillance and Preventive Maintenance Program	X			
Reactor Head Closure Studs Program				X
Reactor Vessel Surveillance Program		X	X	
Selective Leaching Program		X		
Service Water Integrity Program				X
Structures Monitoring – Masonry Wall Program		X		
Structures Monitoring – Structures Monitoring Program		X	X	
Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program		X		

Table B-3
JAFNPP Program Consistency with NUREG-1801 (Continued)

Program Name	Plant Specific	NUREG-1801 Comparison		
		Consistent with NUREG-1801	Programs with Enhancements	Programs with Exceptions to NUREG-1801
Water Chemistry Control – Auxiliary Systems Program	X			
Water Chemistry Control – BWR Program		X		
Water Chemistry Control – Closed Cooling Water Program				X

B.1 AGING MANAGEMENT PROGRAMS AND ACTIVITIES

B.1.1 BURIED PIPING AND TANKS INSPECTION

Program Description

The Buried Piping and Tanks Inspection Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M34, Buried Piping and Tanks Inspection.

This program includes (a) preventive measures to mitigate corrosion and (b) inspections to manage the effects of corrosion on the pressure-retaining capability of buried carbon steel, copper alloy, gray cast iron, and stainless steel components. Preventive measures are in accordance with standard industry practice for maintaining external coatings and wrappings. Buried components are inspected when excavated during maintenance. If trending within the corrective action program identifies susceptible locations, the areas with a history of corrosion problems are evaluated for the need for additional inspection, alternate coating, or replacement.

A focused inspection will be performed within the first ten years of the period of extended operation, unless an opportunistic inspection (or an inspection via a method that allows assessment of pipe condition without excavation) occurs within this ten-year period.

This program will be fully implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection Program at JAFNPP will be consistent with program attributes described in NUREG-1801, Section XI.M34, Buried Piping and Tanks Inspection, with one exception.

Exceptions to NUREG-1801

The Buried Piping and Tanks Inspection Program at JAFNPP will be consistent with program attributes described in NUREG-1801, Section XI.M34, Buried Piping and Tanks Inspection, with the following exception.

Attributes Affected	Exception
4. Detection of Aging Effects	Inspections via methods that allow assessment of pipe condition without excavation may be substituted for inspections requiring excavation solely for the purpose of inspection.[1]

Exception Note

1. Methods such as phased array UT technology provide indication of wall thickness for buried piping without excavation for visual inspection, which could result in damage to coating or wrappings.

Enhancements

None

Operating Experience

The Buried Piping and Tanks Inspection Program at JAFNPP is a new program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. JAFNPP plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

As such, operating experience provides reasonable assurance that implementation of the Buried Piping and Tanks Inspection Program will manage the effects of aging such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extend operation.

Conclusion

Implementation of the Buried Piping and Tanks Inspection Program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.2 BWR CRD RETURN LINE NOZZLE

Program Description

The BWR Control Rod Drive (CRD) Return Line Nozzle Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M6, BWR Control Rod Drive Return Line Nozzle.

Under this program, JAFNPP has cut and capped the CRD return line nozzle to mitigate cracking, and continues Inservice Inspection (ISI) examinations to monitor the effects of crack initiation and growth on the intended function of the control rod drive return line nozzle and cap.

In 2000, a structural weld overlay was installed over a crack in the CRD return line nozzle-to-cap weld. The nickel-based Alloy 52 weld metal used in the overlay is highly resistant to stress corrosion cracking, which was determined to be the cause of the cracking.

NUREG-1801 Consistency

The BWR CRD Return Line Nozzle Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M6, BWR Control Rod Drive Return Line Nozzle, with exceptions and an enhancement.

Exceptions to NUREG-1801

The BWR CRD Return Line Nozzle Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M6, BWR Control Rod Drive Return Line Nozzle, with the following exceptions.

Attributes Affected	Exceptions
1. Scope 3. Parameters Monitored/Inspected	The dissimilar weld between the CRDRL nozzle and end cap is not subject to ISI. per ASME Section XI, Subsection IWB.[1]
2. Preventive Actions	The flow capacity test required by NUREG-0619 was not performed prior to capping the CRDRL nozzle.[2]
4. Detection of Aging Effects 5. Monitoring and Trending	The extent and schedule of inspection, as delineated in NUREG-0619, are not followed. Specifically, liquid penetrant testing (PT) of CRDRL nozzle blend radius, adjacent wall area and bore regions is not performed.[3]

6. Acceptance Criteria	JAFNPP repaired the CRDRL nozzle by weld overlay rather than removing the crack by grinding and examines the overlay using UT in lieu of RT.[4]

Exception Notes

1. The dissimilar weld between the CRDRL nozzle and end cap is exempt from ISI examination requirements per IWB-1220(a). However, this weld is inspected by UT as part of the JAFNPP IGSCC program. JAFNPP also employs HWC and NMCA to mitigate the effects of IGSCC on the CRDRL nozzle.
2. JAFNPP was granted an exemption from the requirement to perform a CRD return flow capacity test per NUREG-0619 through an NRC letter (letter dated August 25, 1983, from D. B. Vassallo [NRC] to J. P. Bayne [NYPA]) issued before the CRDRL modification was made. JAFNPP is not required to perform the flow capacity test, and successful system operation for more than 20 years since the modification has confirmed proper return flow capability.
3. JAFNPP performs EVT-1 visual examinations (1/2 mil resolution) of the CRDRL nozzle blend radius and adjacent wall area every 10 years in lieu of PT examinations. The weld overlay installed over a crack in the CRD return line nozzle-to-cap weld covers the nozzle, the nozzle-to-cap weld, and part of the cap. The nickel-based Alloy 52 weld overlay, which is highly resistant to stress corrosion cracking, is ultrasonically inspected in accordance with GL 88-01 and BWRVIP-75-A. The weld overlay provides reasonable assurance of structural and pressure boundary integrity of the RPV capped N9 nozzle and thus provides an acceptable level of quality and safety. Since the nozzle and original nozzle-to-cap weld are covered by the overlay, and the overlay is examined, examination of the nozzle and original nozzle-to-cap weld is not required.
4, In its letter of October 26, 2000, the NRC concluded that the proposed alternative provides reasonable assurance of structural and pressure boundary integrity of the RPV capped N9 nozzle and thus provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorized use of ASME Code Case N-504-1.

Enhancements

The following enhancement will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancement
1. Scope of Program 3. Parameters Monitored/Inspected	The CRD Return Line Nozzle Program will be enhanced to examine the CRDRL nozzle-to-vessel weld and the CRDRL nozzle inside radius section per section XI Table IWB-2500-1 category B-D items B3.10 and B3.20.

Operating Experience

On October 15, 2000, examination revealed cracking of the control rod drive return line nozzle-to-cap weldment. The probable cause was IGSCC based on the susceptibility of the cap's base material (Inconel 600) and weld metal (Inconel 82/182) to IGSCC cracking. A structural weld overlay was installed with Inconel 52 weld metal, which is highly resistant to stress corrosion cracking. The weld overlay process also imparts a compressive residual stress due to the welding process, which prevents further crack growth.

The N9 nozzle-to-cap weld overlay received all code-required preservice NDE examinations and was pressure tested prior to returning to service. Ultrasonic examination of the nozzle-to-cap weld overlay in RO16 (2004) revealed no indications of cracking. Also, enhanced visual examination (1/2 mil resolution) of the nozzle blend radius and adjacent vessel wall area during 2000 revealed no cracking. Since the weld overlay is highly resistant to cracking, and no indications of cracking have been observed, the BWR CRD Return Line Nozzle Program remains effective for managing the effect of cracking on the intended function of the CRD return line nozzle.

A self-assessment in 2004 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The BWR CRD Return Line Nozzle Program has been effective at managing aging effects. The BWR CRD Return Line Nozzle Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.3 BWR FEEDWATER NOZZLE

Program Description

The BWR Feedwater Nozzle Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M5, BWR Feedwater Nozzle.

Under this program, JAFNPP has removed all identified feedwater blend radii flaws, removed feedwater nozzle cladding, and installed a double piston ring, triple thermal sleeve sparger to mitigate cracking. This program implements enhanced inservice inspection (ISI) of the feedwater nozzles in accordance with the requirements of ASME Section XI, Subsection IWB and the recommendation of General Electric (GE) NE-523-A71-0594 to monitor the effects of cracking on the intended function of the feedwater nozzles.

NUREG-1801 Consistency

The BWR Feedwater Nozzle Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M5, BWR Feedwater Nozzle, with one exception.

Exceptions to NUREG-1801

The BWR Feedwater Nozzle Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M5, BWR Feedwater Nozzle, with the following exception.

Attributes Affected	Exceptions
2. Preventive Actions	The reactor water cleanup system was not rerouted and a low flow controller meeting all requirements of NEDO-21821-A was not installed.[1]

Exception Notes

1. In its safety evaluation of JAFNPP actions taken to address feedwater nozzle cracking, the NRC noted that the intent of the requirements of NUREG-0619 and NEDO-21821-A had been satisfied with the JAFNPP modifications. Since the stainless steel cladding has been removed, the improved spargers have been installed and the control rod drive return line has been cut and capped, an adequate margin of safety against feedwater nozzle crack growth exists. Therefore, NRC concluded that, with continued inspections to monitor for crack initiation and growth, JAFNPP can operate without rerouting the RWCU and without installing a low-flow controller for the feedwater system. Since inspections to monitor for crack initiation and growth will continue per ASME Section XI, this conclusion remains valid for the period of extended operation.

Enhancements

None

Operating Experience

Ultrasonic testing of the feedwater nozzles during RO15 (2002) resulted in no recordable indications. Absence of recordable indications on the feedwater nozzles provides evidence that the program is effective for managing cracking of the nozzles.

As stated in NUREG-1801, Section XI.M5, BWR Feedwater Nozzle, "The present AMP has been implemented for nearly 20 years and found to be effective in managing the effect of cracking on the intended function of feedwater nozzles." Since recent inspection results revealed no recordable indications, the program is effective in managing the effect of cracking on the intended function of the feedwater nozzles.

A self-assessment in 2004 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The BWR Feedwater Nozzle Program has been effective at managing aging effects. The BWR Feedwater Nozzle Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.4 BWR PENETRATIONS

Program Description

The BWR Penetrations Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M8, BWR Penetrations.

The program includes (a) inspection and flaw evaluation in conformance with the guidelines of staff-approved boiling water reactor vessel and internals project (BWRVIP) documents BWRVIP-27-A and BWRVIP-49-A and (b) monitoring and control of reactor coolant water chemistry in accordance with the guidelines of BWRVIP-130 to ensure the long-term integrity of vessel penetrations and nozzles.

NUREG-1801 Consistency

The BWR Penetrations Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M8, BWR Penetrations, with one exception.

Exceptions to NUREG-1801

The BWR Penetrations Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M8, BWR Penetrations, with the following exception.

Attributes Affected	Exceptions
3. Parameters Monitored/ Inspected 4. Detection of Aging Effects	Table IWB-2500-1 from the 1989 edition of ASME Section XI is used, while NUREG-1801 specifies the 2001 edition with 2002 and 2003 addenda.[1]

Exception Notes

1. Since ASME Section XI editions through the 2003 Addenda have been accepted by reference in 10CFR50.55a paragraph (b) (2) without modification or limitation on use of Table IWB-2500-1 from the 1989 edition for BWR components, use of this version is appropriate to assure that components crediting this program can perform their intended function consistent with the current licensing basis during the period of extended operation.

Enhancements

None

Operating Experience

Visual examination of the SLC nozzle during the reactor vessel system leakage test in the last three outages (2000, 2002, and 2004) resulted in no recordable indications or leakage. Absence of recordable indications on the SLC nozzle provides evidence that the program is effective for managing cracking of the nozzle.

Visual examination of the instrument penetration nozzles during the reactor vessel system leakage test in the last three outages (2000, 2002, and 2004) resulted in no recordable indications or leakage. Absence of recordable indications on the instrument penetration nozzles provides evidence that the program is effective for managing cracking of the nozzles.

Self-assessments in 2004 and 2005 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The BWR Penetrations Program has been effective at managing aging effects. The BWR Penetrations Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.5 BWR STRESS CORROSION CRACKING

Program Description

The BWR Stress Corrosion Cracking Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M7, BWR Stress Corrosion Cracking.

The program includes (a) preventive measures to mitigate intergranular stress corrosion cracking (IGSCC), and (b) inspection and flaw evaluation to monitor IGSCC and its effects on reactor coolant pressure boundary components made of stainless steel or CASS.

JAFNPP has taken actions to prevent IGSCC and will continue to use materials resistant to IGSCC for component replacements and repairs following the recommendations delineated in NUREG-0313, Generic Letter 88-01, and the staff-approved BWRVIP-75-A report. Inspection of piping identified in NRC Generic Letter 88-01 to detect and size cracks is performed in accordance with the staff positions on schedule, method, personnel qualification and sample expansion included in the generic letter and the staff-approved BWRVIP-75-A report.

NUREG-1801 Consistency

The BWR Stress Corrosion Cracking Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M7, BWR Stress Corrosion Cracking, with one exception.

Exceptions to NUREG-1801

The BWR Stress Corrosion Cracking Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M7, BWR Stress Corrosion Cracking with the following exception.

Attributes Affected	Exception
6. Acceptance Criteria	The 1989 edition of ASME Section XI is used for flaw evaluation, while NUREG-1801 specifies the 1986 edition.[1]

Exception Note

1. ASME Section XI 1989 edition has been accepted by the NRC in 10 CFR 50.55a(b)(2) without modification or limitation on use of this edition for flaw evaluation. Thus, components crediting this program can be expected to perform their intended function consistent with the current licensing basis during the period of extended operation.

Enhancements

None

Operating Experience

Ultrasonic examinations of four recirculation nozzle safe-end welds, three jet pump instrumentation nozzle safe-end welds, seven recirculation system piping welds, and three RHR system piping welds during RO15 (2002) resulted in six recordable indications, attributed to geometric conditions and not cracks. Absence of cracks on the nozzle safe ends and piping welds provides evidence that the program is effective for managing cracking of austenitic stainless steel components.

Ultrasonic examinations of the CRD nozzle-to-cap weld overlay and three RHR and recirculation system piping welds during RO16 (2004) resulted in one recordable indication, attributed to geometric conditions and not a crack. Absence of cracks on the nozzle and piping welds provides evidence that the program is effective for managing cracking of austenitic stainless steel components.

Conclusion

The BWR Stress Corrosion Cracking Program has been effective at managing aging effects. The BWR Stress Corrosion Cracking Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.6 BWR VESSEL ID ATTACHMENT WELDS

Program Description

The BWR Vessel ID Attachment Welds Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M4, BWR Vessel ID Attachment Welds.

The program includes (a) inspection and flaw evaluation in accordance with the guidelines of staff-approved boiling water reactor vessel and internals project (BWRVIP) BWRVIP-48-A and (b) monitoring and control of reactor coolant water chemistry in accordance with the guidelines of BWRVIP-130 (EPRI Report 1008192) to ensure the long-term integrity and safe operation of reactor vessel inside diameter (ID) attachment welds and support pads.

NUREG-1801 Consistency

The BWR Vessel ID Attachment Welds Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M4, BWR Vessel ID Attachment Welds with one exception.

Exceptions to NUREG-1801

The BWR Vessel ID Attachment Welds Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M4, BWR Vessel ID Attachment Welds with the following exception.

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Attributes Affected	Exception
3. Parameters Monitored/ Inspected	Table IWB-2500-1 from the 1989 edition of ASME Section XI is used, while NUREG-1801 specifies the 2001 edition with 2002 and 2003 addenda.[1]

Exception Note

1. Since ASME Section XI editions through the 2003 Addenda have been accepted by reference in 10CFR50.55a paragraph (b) (2) without modification or limitation on use of Table IWB-2500-1 from the 1989 edition for BWR components, use of this version is appropriate to assure that components crediting this program can perform their intended function consistent with the current licensing basis during the period of extended operation. The JAF plant has also submitted a relief request to use BWRVIP inspections, for the most part, in lieu of ASME XI.

Enhancements

None

Operating Experience

Visual examinations of vessel ID attachment welds have been conducted as follows: core spray brackets inspected during RO13 (1998); jet pump riser brace attachments inspected 50% during RO11 (1994) and 50% during RO13. These examinations resulted in no recordable indications. Absence of recordable indications on the vessel attachment welds provides evidence that the program is effective for managing cracking of the welds.

Visual and enhanced visual examinations of vessel ID attachment welds (jet pump riser brace attachments and feedwater sparger bracket attachments) during RO15 (2002) resulted in no recordable indications. Absence of recordable indications on the vessel attachment welds provides evidence that the program is effective for managing cracking of the welds.

Visual and enhanced visual examinations of vessel ID attachment welds (shroud support gusset plate, steam dryer support brackets, steam dryer hold-down brackets, guide rod and bracket attachments) during RO16 (2004) resulted in no recordable indications. Absence of recordable indications on the vessel attachment welds provides evidence that the program is effective for managing cracking of the welds.

As stated in NUREG-1801, Section XI.M4, BWR Vessel ID Attachment Welds, "Implementation of the program provides reasonable assurance that crack initiation and growth will be adequately managed and the intended functions of the vessel ID attachments will be maintained consistent with the current licensing basis (CLB) for the period of extended operation." Since the program is consistent with the NUREG-1801 program, and recent inspection results revealed no recordable indications, the program is effective in managing the effect of cracking on the intended function of the vessel ID attachments.

Self-assessments in 2004 and 2005 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The BWR Vessel ID Attachment Welds Program has been effective at managing aging effects. The BWR Vessel ID Attachment Welds Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.7 BWR VESSEL INTERNALS

Program Description

The BWR Vessel Internals Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M9, BWR Vessel Internals.

The program includes (a) inspection, flaw evaluation, and repair in conformance with the applicable, staff-approved BWR reactor vessel and internals project (BWRVIP) documents, and (b) monitoring and control of reactor coolant water chemistry in accordance with the guidelines of BWRVIP-130 to ensure the long-term integrity of vessel internal components.

NUREG-1801 Consistency

The BWR Vessel Internals Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M9, BWR Vessel Internals, with exceptions.

Exceptions to NUREG-1801

The BWR Vessel Internals Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M9, BWR Vessel Internals, with the following exceptions.

Attributes Affected	Exceptions
1. Scope of Program 4. Detection of Aging Effects	**Core Plate** JAFNPP provides an alternate inspection for the core plate rim hold-down bolts that is technically justified according to BWRVIP-94.
1. Scope of Program 4. Detection of Aging Effects	**Shroud Support** Focused inspection of bottom surface of the shroud support H9 weld.[1]
1. Scope of Program 4. Detection of Aging Effects	**Top Guide** Deferred inspection of hold-down assemblies at 0° and 180° from RO16 to RO17 with technical justification. The top guide rim weld does not exist at JAFNPP and is therefore exempt.

Attributes Affected	Exceptions
1. Scope of Program 4. Detection of Aging Effects	**Jet Pump Assembly** Inspections for inaccessible welds, beam (UT), and scheduled inspections of high ranked welds have been deferred, but the deferrals are technically justified.[2]
3. Parameters Monitored/ Inspected	JAFNPP uses ASME Section XI Table IWB-2500-1 from the 1998 edition with 2000 addenda, which is a different code year than that specified in NUREG-1801.[3]

Exception Notes

1. Inspection of H9 weld will be in accordance with BWRVIP guidelines.
2. Welds at TS-1, TS-3 and TS-4 are inaccessible for inspection. There is no inspection technique developed to inspect the thermal sleeve welds. However, the BWRVIP/ EPRI NDE Center has new plans to develop an inspection capability. The BWRVIP is also pursuing analyses which may reduce or alleviate inspection of the TS-1 through TS-4 welds. Inspection is recommended when techniques or accessibility becomes available. Also, there are other welds mainly along the diffuser lower section where coverage is low due to interference from core shroud gussets, tie-rods, and others. The BWRVIP is also pursuing an analysis to reduce or alleviate inspection of the adapter welds. A technical justification for inspecting inaccessible jet pump welds, and the deferral of beam UT inspection has been prepared per BWRVIP-94 guidelines. Finally, several high priority ranked welds in JP-1,2,3, 4, 19 and 20 previously scheduled for inspection in RO16, were deferred to RO17 (one cycle deferral) with technical justification.
3. Since ASME Section XI through the 2003 Addenda has been accepted by reference in 10CFR50.55a paragraph (b) (2) without modification or limitation on use of Table IWB-2500-1 from the 1998 edition with 2000 addenda for BWR components, use of this version is appropriate to assure that components crediting this program can perform their intended function consistent with the current licensing basis during the period of extended operation. The JAF plant has also submitted a relief request to use BWRVIP inspections, for the most part, in lieu of ASME XI.

Enhancements

None

Operating Experience

In RO14 (2000), crack-like indications were identified at four core shroud vertical welds. The most limiting core shroud weld #SV5B was re-examined in RO15 (2002) with no discernible

changes in the existing indications. However, an additional indication was found. Several core shroud vertical welds are scheduled for ultrasonic examination in R017.

A core spray piping indication reported in R014 (2000), was re-assessed (after brushing) in R015 (2002). Examination revealed no change in the length of the indication, and concluded that the indication is a scratch, rather than a crack.

Multiple steam dryer upper support ring cracks were discovered in RO10 (1992). Subsequent visual inspection in same area during R014 (2000) revealed no change in the cracks.

Cracks due to IGSCC were identified on the steam dryer during RO16 (2004). The area will be visually re-inspected in R017.

Continued monitoring of existing indications and absence of new recordable indications on the vessel internals provides evidence that the program is effective for managing cracking of the welds.

Self-assessments in 2004 and 2005 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The BWR Vessel Internals Program has been effective at managing aging effects. The BWR Vessel Internals Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.8 CONTAINMENT LEAK RATE

Program Description

The Containment Leak Rate Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.S4, 10 CFR 50, Appendix J.

As described in 10 CFR Part 50, Appendix J, containment leak rate tests are required to assure that (a) leakage through primary reactor containment and systems and components penetrating primary containment shall not exceed allowable values specified in technical specifications or associated bases and (b) periodic surveillance of reactor containment penetrations and isolation valves is performed so that proper maintenance and repairs are made during the service life of containment, and systems and components penetrating primary containment.

NUREG-1801 Consistency

The Containment Leak Rate Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.S4, 10 CFR Part 50, Appendix J.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

During the most recent integrated leakage testing of primary containment, as-found and as-left test data met all applicable test acceptance criteria and no degradation that would threaten the structural integrity of the containment was identified, indicating that the program is effective at managing the effects of loss of material and cracking on primary containment components.

A QA audit in March 2002 and self-assessments in 2004 and 2005 revealed no issues or findings that could impact effectiveness of the program.

As stated in NUREG-1801, Section XI.S4, 10 CFR 50, Appendix J, "To date, the 10 CFR Part 50, Appendix J, LRT program has been effective in preventing unacceptable leakage through the containment pressure boundary. Implementation of Option B for testing frequency must be consistent with plant-specific operating experience." The program is consistent with the NUREG-1801 Option B program. Therefore, the program is effective at managing loss of material and cracking on primary containment components.

Conclusion

The Containment Leak Rate Program has been effective at managing aging effects. The Containment Leak Rate Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.9 DIESEL FUEL MONITORING

Program Description

The Diesel Fuel Monitoring Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M30, Fuel Oil Chemistry Program.

The program entails sampling to ensure that adequate diesel fuel quality is maintained to prevent corrosion of fuel systems. Exposure to fuel oil contaminants such as water and microbiological organisms is minimized by periodic sampling and analysis, draining and cleaning of tanks, and by verifying the quality of new oil before its introduction into the storage tanks.

Sampling and analysis activities are in accordance with technical specifications on fuel oil purity and the guidelines of ASTM Standards D4057-95 and D975-95.

NUREG-1801 Consistency

The Diesel Fuel Monitoring Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M30, Fuel Oil Chemistry Program, with exceptions and enhancements.

Exceptions to NUREG-1801

The Diesel Fuel Monitoring Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M30, Fuel Oil Chemistry Program, with the following exception.

Attributes Affected	Exceptions
1. Scope of Program 3. Parameters Monitored/ Inspected 6. Acceptance Criteria	The guidelines of ASTM Standard D2276 are not used for determination of particulates.[1]

Exception Notes

1. JAFNPP technical specifications specify use of ASTM D6217, which is a test specifically for diesel fuel, rather than ASTM D2276 which is for aviation fuel. Therefore, the guidelines of D6217 are appropriate for determination of particulates.

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
2. Preventive Actions 4. Detection of Aging Effects	The Diesel Fuel Monitoring Program will be enhanced to include periodic draining, cleaning, visual inspections, and ultrasonic measurement of the bottom surfaces of the fire pump diesel fuel oil tanks, EDG day tanks, and EDG fuel oil storage tanks to ensure that significant degradation is not occurring.
6. Acceptance Criteria	The Diesel Fuel Monitoring Program will be enhanced to specify acceptance criterion for UT measurements of diesel generator fuel storage tanks within the scope of this program.

Operating Experience

In 2000, sample results for EDG fuel oil storage tanks (93TK-6B and D) exceeded the industry acceptable limit for particulate contamination. Resample results of TK-6B were acceptable. TK-6D was drained and refilled with fresh fuel oil.

In May 2000, approximately 20 gallons of fuel oil was added to fire pump diesel fuel oil tank 76TK-10 from a fuel oil tank that had not been sampled to ensure it met the requirements for fuel oil quality. Procedures were changed and training was held to preclude recurrence of this event.

In 2002, trending of bottom sample results for EDG fuel oil storage tank 93TK-6C shows a particulate contamination increase from 3 mg/liter to 6-8 mg/liter. 2000 gallons of fuel oil was removed from the bottom of the tank and the tank was refilled with fresh fuel oil.

In 2004, the testing frequency for new fuel oil was not per requirements. Technical specifications require that, within 31 days following addition of the new fuel oil to storage tanks properties of the new fuel oil are verified to be within the limits for ASTM 2D fuel oil. Results from samples of new fuel oil sent to offsite testing facilities were not received within the 31 day time frame. Procedures were revised and new testing vendors were employed to prevent recurrence.

Other than the above instances, fuel oil sampling results from 2000 through 2004 reveal that fuel oil quality is being maintained in compliance with acceptance criteria. Visual inspections of EDG fuel oil tank internals in 1995 [93TK-6B], 2001 [93TK-6A and D], and 2004 [93TK-6C] revealed no degradation. Also, ultrasonic inspections of the EDG fuel oil tanks in 1988 revealed no degradation. Continuous confirmation of diesel fuel quality, timely corrective actions, and absence of degradation in the fuel oil storage tanks provide evidence that the program is effective in managing loss of material of fuel system components.

Conclusion

The Diesel Fuel Monitoring Program has been effective at managing aging effects. The Diesel Fuel Monitoring Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended function consistent with the current licensing basis for the period of extended operation.

B.1.10 ENVIRONMENTAL QUALIFICATION OF ELECTRIC COMPONENTS

Program Description

The Environmental Qualification (EQ) of Electric Components Program at JAFNPP is comparable to the program described in NUREG-1801, Section X.E1, Environmental Qualification (EQ) of Electric Components.

The Nuclear Regulatory Commission (NRC) has established nuclear station environmental qualification (EQ) requirements in 10 CFR Part 50, Appendix A, Criterion 4, and 10 CFR 50.49. 10 CFR 50.49 specifically requires that an EQ program be established to demonstrate that certain electrical components located in harsh plant environments (that is, those areas of the plant that could be subject to the harsh environmental effects of a loss of coolant accident (LOCA), high energy line breaks (HELBs) or post-LOCA radiation) are qualified to perform their safety function in those harsh environments. 10 CFR 50.49 requires that the effects of significant aging mechanisms be addressed as part of environmental qualification.

The JAFNPP EQ program manages the effects of thermal, radiation, and cyclic aging through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components are refurbished, replaced, or their qualification is extended prior to reaching the aging limits established in the evaluation. Aging evaluations for EQ components are considered time-limited aging analyses (TLAAs) for license renewal.

EQ Component Reanalysis Attributes

The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of an EQ program. While a component life limiting condition may be due to thermal, radiation, or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed ambient temperature of the component, an unrealistically low activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to the station's quality assurance program requirements, which requires the verification of assumptions and conclusions. As already noted, important attributes of a reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). These attributes are discussed below.

Analytical Methods: The analytical models used in the reanalysis of an aging evaluation are the same as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license

renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40-year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging, a similar approach may be used. Other models may be justified on a case-by-case basis.

Data Collection and Reduction Methods: Reducing excess conservatism in the component service conditions (for example, temperature, radiation, cycles) used in the prior aging evaluation is the chief method used for a reanalysis. Temperature data used in an aging evaluation is to be conservative and based on plant design temperatures or on actual plant temperature data. When used, plant temperature data can be obtained in several ways, including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors (while the motor is not running). A representative number of temperature measurements are conservatively evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as (a) directly applying the plant temperature data in the evaluation, or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis are to be justified on a plant-specific basis. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.

Underlying Assumptions: EQ component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Acceptance Criteria and Corrective Actions: The reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component is to be refurbished, replaced, or requalified prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or requalify the component if the reanalysis is unsuccessful).

NUREG-1801 Consistency

The Environmental Qualification (EQ) of Electric Components Program at JAFNPP is consistent with the program described in NUREG-1801, Section X.E1, Environmental Qualification (EQ) of Electric Components.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

In September 1994, incorrect assumptions were identified in EQ analyses. Corrective actions included modifications, evaluation of assumptions in other program documents, and evaluation of environmental conditions. Identification of incorrect assumptions and timely corrective actions provide evidence that the program is effective in assuring that equipment is maintained within its qualification basis and qualified life.

In 2002, a 10 CFR Part 21 notification was made concerning an error in dose units for irradiation performed during EGS Qualification Testing by Georgia Tech's Neely Nuclear Research Center. Review of the affected equipment (tape splices) found the equipment qualified with sufficient margin that accounting for the error by reducing the radiation value by 13% would not affect qualification. Program documents were revised accordingly. Identification of incorrect assumptions and timely corrective actions provide evidence that the program is effective in assuring that equipment is maintained within its qualification basis and qualified life.

The overall effectiveness of the EQ of Electric Components Program is demonstrated by the excellent OE for systems, structures, and components in the program. A snapshot self-assessment in July 2004 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The Environmental Qualification (EQ) of Electric Components Program has been effective at managing aging effects. The Environmental Qualification (EQ) of Electric Components Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended function consistent with the current licensing basis for the period of extended operation.

B.1.11 EXTERNAL SURFACES MONITORING

Program Description

The External Surfaces Monitoring Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M36, External Surfaces Monitoring.

This program entails inspections of external surfaces of components subject to aging management review. The program is also credited with managing loss of material from internal surfaces, for situations in which internal and external material and environment combinations are the same such that external surface condition is representative of internal surface condition.

NUREG-1801 Consistency

The External Surfaces Monitoring Program is consistent with the program described in NUREG-1801, Section XI.M36, External Surfaces Monitoring with an enhancement.

Exceptions to NUREG-1801

None

Enhancements

The following enhancement will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancement
1. Scope of Program	External Surfaces Monitoring Program guidance documents will be enhanced to clarify license renewal commitment. The commitment for license renewal is for periodic inspections of systems in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(1) and (a)(3). Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(2).

Operating Experience

External Surface Monitoring walkdowns between 2000 and 2004 identified evidence of aging effects, including corrosion and leakage. Corrective actions were accomplished in accordance with the site Corrective Action Program. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing aging effects for passive components

Conclusion

The External Surfaces Monitoring Program has been effective at managing aging effects. The External Surfaces Monitoring Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.12 FATIGUE MONITORING

Program Description

The Fatigue Monitoring Program at JAFNPP is comparable to the program described in NUREG-1801, Section X.M1, Metal Fatigue of Reactor Coolant Pressure Boundary.

In order not to exceed design limits on fatigue usage, the Fatigue Monitoring Program tracks the number of critical thermal and pressure transients for selected reactor coolant system components. The program ensures the validity of analyses that explicitly assumed a specified number of fatigue transients by assuring that the actual effective number of transients is not exceeded.

NUREG-1801 Consistency

The Fatigue Monitoring Program at JAFNPP is consistent with the program described in NUREG-1801, Section X.M1, Metal Fatigue of Reactor Coolant Pressure Boundary, with exceptions.

Exceptions to NUREG-1801

The Fatigue Monitoring Program at JAFNPP is consistent with the program described in NUREG-1801, Section X.M1, Metal Fatigue of Reactor Coolant Pressure Boundary, with the following exceptions.

Attributes Affected	Exceptions
2. Preventive Actions 6. Acceptance Criteria	The Fatigue Monitoring Program only involves tracking the number of transient cycles and does not include assessment of the impact of the reactor water environment on critical components.[1]
4. Detection of Aging Effects	The JAFNPP program does not provide for periodic update of the fatigue usage calculations.[2]

Exception Notes

1. The effect of the reactor water environment on fatigue is addressed as described in Section 4.3.3.
2. Updates of fatigue usage calculations are not necessary unless the number of accumulated fatigue cycles approaches the number of assumed design cycles. The JAFNPP program provides for periodic assessment of the number of accumulated cycles. If a design cycle assumption is approached, corrective action is taken which may include update of the fatigue usage calculation.

Enhancements

None

Operating Experience

For recent reactor shutdowns and startups, cycle limitations did not trend toward exceeding the allowable number of cycles. This demonstrates that the program continues to monitor plant transients and track the accumulation of these transients.

Conclusion

The Fatigue Monitoring Program has been demonstrated to maintain the validity of the fatigue design basis for reactor coolant system components designed to withstand the effects of cyclic loads due to reactor system transients.

The Fatigue Monitoring Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended function consistent with the current licensing basis for the period of extended operation.

B.1.13 FIRE PROTECTION PROGRAMS

The fire protection programs for JAFNPP include the Fire Protection Program and the Fire Water System Program. These two programs are comparable to NUREG-1801, Section XI.M26, Fire Protection and NUREG-1801, Section XI.M27, Fire Water System, respectively.

The Fire Protection programs are discussed in more detail in the following subsections

- Fire Protection
- Fire Water System

B.1.13.1 FIRE PROTECTION

Program Description

The Fire Protection Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M26, Fire Protection.

The program includes a fire barrier inspection and a diesel-driven fire pump inspection. The fire barrier inspection requires periodic visual inspection of fire barrier penetration seals, fire dampers and frames, fire barrier walls, ceilings, and floors, and periodic visual inspection and functional tests of fire rated doors to ensure that their operability is maintained. The diesel-driven fire pump inspection requires that the pump and its driver be periodically tested and inspected to ensure that diesel engine sub-systems, including the fuel supply line, can perform their intended functions.

NUREG-1801 Consistency

The Fire Protection Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M26, Fire Protection, with an enhancement.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
1. Scope 3. Parameters Monitored/Inspected 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria	The Fire Protection Program will be enhanced to inspect fire barrier walls, ceilings, and floors at least once every refueling outage. Inspection results will be acceptable if there are no visual indications of degradation such as cracks, holes, spalling, or gouges.
4. Detection of Aging Effects	The Fire Protection Program will be enhanced to inspect at least one seal of each type every 24 months.

Operating Experience

Inspections of fire stops, fire barrier penetration seals, fire barrier walls, ceilings, and floors from 2000 through 2004, revealed signs of degradation such as cracks, gaps, voids, holes or missing material. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing aging effects for fire barrier components.

Visual inspections and functional tests of fire doors, from 2000 through 2004, detected degradation of fire doors, such as corrosion, wear and missing parts. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing loss of material for fire doors.

The diesel-driven fire pump was observed while it was running in June 2005. No leaks or degradation of diesel engine sub-systems, including the fuel supply line, were noted. Continuing monitoring provides evidence that the program is effective for managing aging of diesel-driven fire pump subsystem components.

QA audits and surveillances in 2002 and 2003 revealed that the material condition of system equipment was good and met licensing requirements. The audits and surveillances revealed no issues or findings that could impact effectiveness of the program to manage aging effects for fire protection components.

In March 2005, NRC completed a triennial fire protection team inspection to assess whether the plant has implemented an adequate fire protection program and that post-fire safe shutdown capabilities have been established and are being properly maintained. Results confirmed that

plant personnel were maintaining the fire protection systems in accordance with their fire protection program and identifying program deficiencies and implementing appropriate corrective actions. The team also evaluated the material condition of fire area boundaries, fire doors, and fire dampers and concluded that plant personnel were maintaining passive features in a state of readiness

Conclusion

The Fire Protection Program has been effective at managing aging effects. The Fire Protection Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.13.2 FIRE WATER SYSTEM

Program Description

The Fire Water System Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M27, Fire Water System.

The program applies to water-based fire protection systems that consist of sprinklers, nozzles, fittings, valves, hydrants, hose stations, standpipes, and aboveground and underground piping and components that are tested in accordance with applicable National Fire Protection Association (NFPA) codes and standards. Such testing assures functionality of systems. Also, many of these systems are normally maintained at required operating pressure and monitored such that leakage resulting in loss of system pressure is immediately detected and corrective actions initiated.

In addition, wall thickness evaluations of fire protection piping are periodically performed on system components using non-intrusive techniques (e.g., volumetric testing) to identify evidence of loss of material due to corrosion.

A sample of sprinkler heads will be inspected using the guidance of NFPA 25 (2002 edition), Section 5.3.1.1.1. NFPA 25 states that, "where sprinklers have been in place for 50 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory for field service testing." NFPA 25 also contains guidance to perform this sampling every 10 years after initial field service testing.

NUREG-1801 Consistency

The Fire Water System Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M27, Fire Water System, with exceptions and enhancements.

Exceptions to NUREG-1801

The Fire Water System Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M27, Fire Water System, with the following exception.

Attributes Affected	Exception
3. Parameters Monitored/ Inspected	NUREG-1801 specifies that periodic flow testing of the fire water system is performed using the guidelines of NFPA 25. Under the JAFNPP program, this test is performed in accordance with Section 11, Chapter 5 of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association.[1]
4. Detection of Aging Effects	NUREG-1801 specifies annual fire hydrant hose hydrostatic tests. However, the hoses are not subject to aging management since they are periodically inspected, hydrotested, and replaced.[2]
4. Detection of Aging Effects	NUREG-1801 specifies annual gasket inspections. Under the JAFNPP program, visual inspection, re-racking and replacement of gaskets in couplings occurs at least once per operating cycle (every 24 months in high radiation areas).[3]

Exception Notes

1. Use of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association, is an appropriate application of industry standards to ensure no loss of function of this system.
2. Table 2.1-3 of NUREG-1800 Rev. 1 provides for the exclusion of fire hoses from aging management review based on their short-lived nature.
3. Since aging effects are typically manifested over several years, differences in inspection and testing frequencies are insignificant.

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
3. Parameters Monitored/ Inspected 6. Acceptance Criteria	Procedures will be enhanced to include inspection of hose reels for corrosion. Acceptance criteria will be enhanced to verify no significant corrosion.
3. Parameters Monitored/ Inspected 6. Acceptance Criteria	Procedures for sprinkler systems will be enhanced to include visual inspection of spray and sprinkler system internals for evidence of corrosion. Acceptance criteria will be enhanced to verify no significant corrosion.
4. Detection of Aging Effects	A sample of sprinkler heads will be inspected using guidance of NFPA 25 (2002 Edition) Section 5.3.1.1.1. NFPA 25 also contains guidance to repeat this sampling every 10 years after initial field service testing.
4. Detection of Aging Effects	Wall thickness evaluations of fire protection piping will be performed on system components using non-intrusive techniques (e.g., volumetric testing) to identify evidence of loss of material due to corrosion. These inspections will be performed before the end of the current operating term and at intervals thereafter during the period of extended operation. Results of the initial evaluations will be used to determine the appropriate inspection interval to ensure aging effects are identified prior to loss of intended function.

Operating Experience

Visual inspections of fire hose station equipment in October 2005 revealed no loss of material on hose station steel parts. In the past, fire hose station angle valves have been replaced due to corrosion. Identification of degradation and corrective action prior to loss of intended function

provide evidence that the program is effective for managing aging effects for steel fire water system components.

Full flow tests of fire main segments and hydrant inspections from 2003 through 2005 found no evidence of obstruction or loss of material. Spray and sprinkler system functional tests and visual inspections of piping and nozzles, from 2004 through 2006 found no evidence of blockage or loss of material. Confirmation of absence of degradation provides evidence that the program is effective for managing loss of material for fire water system components.

QA audits and surveillances in 2002 and 2003 revealed that the material condition of system equipment was good and met licensing requirements. The audits and surveillances revealed no issues or findings that could impact effectiveness of the program to manage aging effects for fire protection components.

In March 2005, NRC completed a triennial fire protection team inspection to assess whether the plant has implemented an adequate fire protection program and that post-fire safe shutdown capabilities have been established and are being properly maintained. Results confirmed that plant personnel were maintaining the fire protection systems in accordance with their fire protection program and identifying program deficiencies and implementing appropriate corrective actions. The team also reviewed fire detection and suppression surveillance procedures and concluded that plant personnel were maintaining passive features in a state of readiness

Conclusion

The Fire Water System Program has been effective at managing aging effects. The Fire Water System Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended function consistent with the current licensing basis for the period of extended operation.

B.1.14 FLOW-ACCELERATED CORROSION

Program Description

The Flow-Accelerated Corrosion (FAC) Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M17, Flow-Accelerated Corrosion.

This program applies to safety-related and nonsafety-related carbon steel components in systems containing high-energy fluids carrying two-phase or single-phase high-energy fluid > 2% of plant operating time.

The program, based on EPRI recommendations for an effective flow-accelerated corrosion program, predicts, detects, and monitors FAC in plant piping and other pressure retaining components. This program includes (a) an evaluation to determine critical locations, (b) initial operational inspections to determine the extent of thinning at these locations, and (c) follow-up inspections to confirm predictions, or repair or replace components as necessary.

NUREG-1801 Consistency

The FAC Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M17, Flow-Accelerated Corrosion.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

From 2000 through 2004, FAC ultrasonic examinations of carbon steel components in systems containing steam or treated water revealed wall thinning due to corrosion, erosion, and FAC. Corrective actions were accomplished in accordance with the site Corrective Action Program. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing aging effects for fire barrier components.

Eleven FAC UT examinations were performed during RO16 (2004) on components in the feedwater and main steam systems. None of the examinations detected decreased wall thickness. Absence of loss of material provides evidence that the program is effective for managing loss of material in carbon steel components.

Conclusion

The FAC Program has been effective at managing aging effects. The FAC Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.15 HEAT EXCHANGER MONITORING

Program Description

There is no corresponding NUREG-1801 program.

The Heat Exchanger Monitoring Program will inspect heat exchangers for degradation. If degradation is found, then an evaluation will be performed to evaluate its effects on the heat exchanger's design functions including its ability to withstand a seismic event.

Representative tubes within the sample population of heat exchangers will be eddy current tested at a frequency determined by internal and external operating experience to ensure that effects of aging are identified prior to loss of intended function. Along with each eddy current test, visual inspections will be performed on accessible heat exchanger heads, covers and tube sheets to monitor surface condition for indications of loss of material. The population of heat exchangers includes the HPCI turbine lube oil coolers and gland seal condensers, and EDG lube oil heat exchangers.

The program will be fully implemented prior to the period of extended operation.

Evaluation

1. Scope of Program

The Heat Exchanger Monitoring Program will manage aging effects on selected heat exchangers in various systems as identified in aging management reviews.

2. Preventive Actions

This is an inspection program and no actions are taken as part of this program to prevent degradation.

3. Parameters Monitored/Inspected

Where practical, eddy current inspections of shell-and-tube heat exchanger tubes will be performed to determine tube wall thickness. Visual inspections will be performed on heat exchanger heads, covers and tube sheets where accessible to monitor surface condition for indications of loss of material.

4. Detection of Aging Effects

Loss of material is the aging effect managed by this program. Representative tubes within the sample population of heat exchangers will be eddy current tested at a frequency determined by internal and external operating experience to ensure that effects of aging are identified prior to loss of intended function. Visual inspections of

accessible heat exchangers will be performed on the same frequency as eddy current inspections.

An appropriate sample population of heat exchangers will be determined based on operating experience prior to inspections. Inspection can reveal loss of material that could result in degradation of the heat exchangers. Fouling is not addressed by this program.

5. Monitoring and Trending

Results will be evaluated against established acceptance criteria and an assessment will be made regarding the applicable degradation mechanism, degradation rate and allowable degradation level. This information will be used to develop future inspection scope and to modify inspection frequency, if appropriate. Wall thickness will be trended and projected to the next inspection. Corrective actions will be taken if projections indicate that the acceptance criteria may not be met at the next inspection.

6. Acceptance Criteria

The minimum acceptable tube wall thickness for each heat exchanger to be eddy current inspected will be established based upon a component-specific engineering evaluation. Wall thickness will be acceptable if greater than the minimum wall thickness for the component.

The acceptance criterion for visual inspections of heat exchanger heads, covers and tubesheets will be no evidence of degradation that could lead to loss of function. If degradation that could lead to loss of intended function is detected, a condition report will be written and the issue resolved in accordance with the site corrective action program.

7. Corrective Actions

This program will be administered under the site QA program, which meets requirements of 10 CFR Part 50, Appendix B.

8. Confirmation Process

This attribute is discussed in Section B.0.3.

9. Administrative Controls

This attribute is discussed in Section B.0.3.

10. Operating Experience

The Heat Exchanger Monitoring Program at JAFNPP is a new program. The elements which comprise this program (e.g., the scope of the inspections and inspection techniques) are consistent with industry practice.

As such, operating experience provides reasonable assurance that implementation of the Heat Exchanger Monitoring Program will manage the effects of aging such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extend operation.

Conclusion

The Heat Exchanger Monitoring Program will be effective for managing aging effects since it will incorporate proven monitoring techniques and conservative acceptance criteria. The Heat Exchanger Monitoring Program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.16 INSERVICE INSPECTION

Regulation 10 CFR 50.55a, imposes inservice inspection (ISI) requirements of ASME Code, The inservice inspection programs are discussed in the following subsections.

- Containment Inservice Inspection (CII)
- Inservice Inspection (ISI)

B.1.16.1 CONTAINMENT INSERVICE INSPECTION (CII)

Program Description

The JAFNPP Containment Inservice Inspection (CII) Program is a plant-specific program encompassing requirements for the inspection of Class MC pressure-retaining components (Primary Containment) and their integral attachments in accordance with the ASME Boiler and Pressure Vessel Code, 1998 Edition with no Addenda, Section XI, Subsection IWE examination Category E-A, Item No. E1.11 and 1998 Edition with no Addenda, Section XI, Subsection IWE Examination Category E-A, Item No. E1.10.

10 CFR 50.55a imposes inservice inspection requirements of ASME Code Section XI for Class MC and Class CC containment structures. Subsection IWE is for Class MC containments and for steel liners for concrete containments (Class CC). The scope of IWE includes steel liners for concrete containment and their integral attachments; containment hatches and airlocks; moisture barriers; and pressure-retaining bolting.

The program uses nondestructive examination (NDE) techniques to detect and characterize flaws. Three different types of examinations are volumetric, surface, and visual. Volumetric examinations are the most extensive, using methods such as radiographic, ultrasonic or eddy current examinations to locate surface and subsurface flaws. Surface examinations, such as magnetic particle or dye penetrant testing, are used to locate surface flaws.

Three levels of visual examinations are specified. VT-1 visual examination is conducted to assess condition of the surface of the part being examined, looking for cracks and symptoms of wear, corrosion, erosion or physical damage. It can be done with either direct visual observation or with remote examination using various optical/video devices. The VT-2 examination is conducted specifically to locate evidence of leakage from pressure retaining components (period pressure tests). While the system is under pressure for a leakage test, visual examinations are conducted to detect direct or indirect indication of leakage. The VT-3 examination is conducted to determine the general mechanical and structural condition of components and supports and to detect discontinuities and imperfections. For containment inservice inspection, general visual and detailed visual examinations are used in addition to VT examinations as allowed by 10 CFR 50.55a.

Evaluation

1. Scope of Program

The CII Program, under ASME Section XI Subsection IWE, manages loss of material for the primary containment and its integral attachments. The primary containment is a General Electric Mark I pressure suppression containment system. The system consists of a drywell (housing the reactor vessel and reactor coolant recirculation loops), a pressure suppression chamber (housing a water pool), and the connecting vent system between the drywell and the water pool, isolation valves, and containment cooling systems. The code of construction for the containment structure is the ASME Section III, 1968 Edition including the 1968 Summer Addenda.

2. Preventive Actions

The CII Program is a monitoring program that does not include preventive actions.

3. Parameters Monitored/Inspected

The primary containment and its attachments are inspected for evidence of cracks, wear, and corrosion.

4. Detection of Aging Effects

The CII Program manages loss of material and cracking for the primary containment and its integral attachments.

The primary inspection method for the primary containment and its integral attachments is visual examination. Visual examinations are performed either directly or remotely with sufficient illumination and resolution suitable for the local environment to assess general conditions that may affect either the containment structural integrity or leak tightness of the pressure retaining component. The program includes augmented ultrasonic exams to measure wall thickness of the containment structure.

For steel, the CII Program manages loss of material and cracking for ASME Code Class MC pressure-retaining steel components and their integral attachments. This aging effect is managed by visual inspections required by ASME Section XI, Subsection IWE.

5. Monitoring and Trending

Results are compared, as appropriate, to baseline data and other previous test results. If indications are accepted for continued use by analytical evaluation, the areas containing such flaws are monitored during successive inspection periods.

6. Acceptance Criteria

Results are compared, as appropriate, to baseline data, other previous test results, and acceptance criteria of the ASME Section XI, Subsection IWE for evaluation of any evidence of degradation.

7. Corrective Actions

Subsection IWE states that components whose examination results indicate flaws or areas of degradation that do not meet the acceptance standards are acceptable if an engineering evaluation indicates that the flaw or area of degradation is nonstructural in nature or has no effect on the structural integrity of the containment. Except as permitted by 10 CFR 50.55a(b)(ix)(D), components that do not meet the acceptance standards are subject to additional examination requirements, and the components are repaired or replaced to the extent necessary to meet the acceptance standards. Corrective actions for this program will be administered under the site QA program which meets requirements of 10 CFR Part 50, Appendix B.

8. Confirmation Process

This attribute is discussed in Section B.0.3.

9. Administrative Controls

This attribute is discussed in Section B.0.3.

10. Operating Experience

Results of the CII general visual walkdown of primary containment during RO15 (2002) revealed minor areas of peeling paint and rust scale. A work request was initiated to repaint the affected areas as necessary. Absence of significant loss of material provides evidence that the program is effective for managing aging effects.

Results of the CII general visual walkdown of primary containment during RO16 (2004) revealed no significant loss of material. Also, the torus interior general visual inspection and torus exterior inspection and ultrasonic examination revealed no significant loss of material or unacceptable indications. Absence of loss of material provides evidence that the program is effective for managing aging effects.

A self-assessment in 2004 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The CII Program has been effective at managing aging effects. The CII Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.16.2 INSERVICE INSPECTION

Program Description

The JAFNPP Inservice Inspection (ISI) Program is a plant-specific program encompassing ASME Section XI, Subsections IWA, IWB, IWC, IWD and IWF requirements.

Regulation 10 CFR 50.55a, imposes inservice inspection (ISI) requirements of ASME Code, Section XI, for Class 1, 2, and 3 pressure-retaining components, their integral attachments, and supports in light-water cooled power plants. Inspection, repair, and replacement of these components are covered in Subsections IWB, IWC, IWD, and IWF respectively. The program includes periodic visual, surface, and volumetric examination and leakage tests of Class 1, 2, and 3 pressure-retaining components, their integral attachments and supports.

Inservice inspection of supports for ASME piping and components is addressed in Section XI, Subsection IWF. ASME Code Section XI, Subsection IWF constitutes an existing mandated program applicable to managing aging of ASME Class 1, 2, 3, and MC supports for license renewal.

The program uses nondestructive examination (NDE) techniques to detect and characterize flaws. Three different types of examinations are volumetric, surface, and visual. Volumetric examinations are the most extensive, using methods such as radiographic, ultrasonic or eddy current examinations to locate surface and subsurface flaws. Surface examinations, such as magnetic particle or dye penetrant testing, are used to locate surface flaws.

Three levels of visual examinations are specified. VT-1 visual examination is conducted to assess condition of the surface of the part being examined, looking for cracks and symptoms of wear, corrosion, erosion or physical damage. It can be done with either direct visual observation or with remote examination using various optical/video devices. The VT-2 examination is conducted specifically to locate evidence of leakage from pressure retaining components (period pressure tests). While the system is under pressure for a leakage test, visual examinations are conducted to detect direct or indirect indication of leakage. The VT-3 examination is conducted to determine the general mechanical and structural condition of components and supports and to detect discontinuities and imperfections.

The ISI Program is based on ASME Inspection Program B (IWA-2432), which has 10-year inspection intervals. Every 10 years the program is updated to the latest ASME Section XI code

edition and addendum approved by the NRC in 10CFR50.55a. On September 28, 1997 JAFNPP entered the third ISI interval. The ASME code edition and addenda used for the third interval is the 1989 Edition with no Addenda. The current program ensures that the structural integrity of Class 1, 2, and 3 systems and associated supports is maintained at the level required by 10 CFR 50.55a.

Evaluation

1. Scope of Program

The ISI Program manages cracking, loss of material, and reduction of fracture toughness of reactor coolant system piping, components, and supports. The program implements applicable requirements of ASME Section XI, Subsections IWA, IWB, IWC, IWD and IWF, and other requirements specified in 10 CFR 50.55a with approved NRC alternatives and relief requests. Every 10 years the ISI Program is updated to the latest ASME Section XI code edition and addendum approved by the NRC in 10 CFR 50.55a.

ASME Section XI inspection requirements for Reactor Vessel Internals (Subsection IWB, Categories B-N-1 and B-N-2) are not in the ISI Program, but are included in the BWR Vessel Internals Program.

2. Preventive Actions

The ISI Program is a condition monitoring program that does not include preventive actions.

3. Parameters Monitored/Inspected

The program uses nondestructive examination (NDE) techniques to detect and characterize flaws. Volumetric examinations such as radiographic, ultrasonic or eddy current examinations are used to locate surface and subsurface flaws. Surface examinations, such as magnetic particle or dye penetrant testing, are used to locate surface flaws.

Three levels of visual examinations are specified. VT-1 visual examination is conducted to assess the condition of the surface of the part being examined, looking for cracks and symptoms of wear, corrosion, erosion or physical damage. It can be done with either direct visual observation or with remote examination using various optical and video devices. VT-2 visual examination is conducted specifically to locate evidence of leakage from pressure retaining components (period pressure tests). While the system is under pressure for a leakage test, visual examinations are conducted to detect direct or indirect indication of leakage. VT-3 visual examination is conducted to determine general mechanical and structural condition of components and supports and to detect discontinuities and imperfections.

4. Detection of Aging Effects

The ISI Program manages cracking and loss of material, as applicable, for carbon steel, low alloy steel, low alloy steel with stainless steel cladding, and stainless steel/ nickel based alloy subcomponents of the reactor pressure vessel using NDE techniques specified in ASME Section XI, Subsections IWB, IWC, and IWD examination categories.

The ISI Program manages cracking, loss of material, and reduction of fracture toughness, as applicable, of reactor coolant system components using NDE techniques specified in ASME Section XI, Subsections IWB, IWC and IWD examination categories.

The ISI Program manages loss of material for ASME Class MC and Class 1, 2, and 3 piping and component supports and their anchorages by visual examination of components using NDE techniques specified in ASME Section XI, Subsection IWF examination categories.

No aging effects requiring management are identified for lubrite sliding supports. However, the ISI Program will confirm the absence of aging effects for the period of extended operation.

5. Monitoring and Trending

Results are compared, as appropriate, to baseline data and other previous test results. Indications are evaluated in accordance with ASME Section XI. If the component is qualified as acceptable for continued service, the area containing the indication is reexamined during subsequent inspection periods. Examinations that reveal indications that exceed the acceptance standards are extended to include additional examinations in accordance with ASME Section XI.

ISI results are recorded every operating cycle and provided to the NRC every period via Owner's Activity Reports. These detailed reports include scope of inspection and significant inspection results.

6. Acceptance Criteria

A preservice, or baseline, inspection of program components was performed prior to startup to assure freedom from defects greater than code-allowable. This baseline data also provides a basis for evaluating subsequent inservice inspection results. Since plant startup, additional inspection criteria for Class 2 and 3 components have been imposed by 10 CFR 50.55a for which baseline and inservice data has also been obtained. Results of inservice inspections are compared, as appropriate, to baseline

data, other previous test results, and acceptance criteria of the ASME Section XI, 1989 Edition, no Addenda, for evaluation of any evidence of degradation.

7. Corrective Actions

If a flaw is discovered during an ISI examination, an evaluation is conducted in accordance with articles IWA-3000 and IWB-3000, IWC-3000, IWD-3000 or IWF-3000 as appropriate. If flaws exceed acceptance standards, such flaws are removed, repaired, or the component is replaced prior to its return to service. For Class 1, 2, and 3, repair and replacement is in conformance with IWA-4000. Acceptance of flaws which exceed acceptance criteria may be accomplished through analytical evaluation without repair, removal or replacement of the flawed component if the evaluation meets the criteria specified in the applicable article of the code. Corrective actions for this program will be administered under the site QA program which meets requirements of 10 CFR Part 50, Appendix B.

8. Confirmation Process

This attribute is discussed in Section B.0.3.

9. Administrative Controls

This attribute is discussed in Section B.0.3.

10. Operating Experience

Results of ISI examinations during RO15 (2002) revealed a pipe support with as-built configuration discrepancies, which were accepted by evaluation and reflected on applicable drawings. Also, a visual inspection revealed loose clamp nuts on a spring can pipe support. The nuts were tightened. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing aging effects.

Results of ISI examinations during RFO16 (2004) revealed that a few pipe supports had as-built configuration discrepancies, which were accepted by evaluation and reflected on applicable drawings. Also, ultrasonic examination of a feedwater pipe-to-valve weld identified a subsurface planer indication, which was accepted by evaluation. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing aging effects.

A self-assessment in 2004 revealed no issues or findings that could impact effectiveness of the program.

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
4. Detection of Aging Effects	The ISI Program will be enhanced to provide periodic inspections to confirm the absence of aging effects for lubrite sliding supports used in the torus supports at JAFNPP.

Conclusion

The ISI Program has been effective at managing aging effects. The ISI Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.17 METAL-ENCLOSED BUS INSPECTION

Program Description

The Metal-Enclosed Bus Inspection Program at JAFNPP will be comparable to the program described in NUREG-1801, Section XI.E4, Metal-Enclosed Bus.

Under the Metal-Enclosed Bus Inspection Program, internal portions of the non-segregated phase bus T2Y and T3Y components will be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. Bus insulation will be inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. Internal bus supports are inspected for structural integrity and signs of cracks. Since bolted connections are covered with heat shrink tape or insulating boots per manufacturer's recommendations, a sample of accessible bolted connections will be visually inspected for insulation material surface anomalies. Enclosure assemblies will be visually inspected for evidence of loss of material and, where applicable, enclosure assembly elastomers are visually inspected and manually flexed to manage cracking and change in material properties.

The program will be fully implemented prior to the period of extended operation.

NUREG-1801 Consistency

The program attributes of the Metal-Enclosed Bus Inspection Program at JAFNPP will be consistent with the program attributes described in NUREG-1801, Section XI.E4, Metal-Enclosed Bus, with exceptions.

Exceptions to NUREG-1801

The program attributes of the Metal-Enclosed Bus (MEB) Inspection Program at JAFNPP will be consistent with the program attributes described in NUREG-1801, Section XI.E4, Metal-Enclosed Bus Aging Management Program, with the following exception.

Attributes Affected	Exception
3. Parameters Monitored/ Inspected 4. Detection of Aging Effects	MEB enclosure assemblies will be inspected under this program instead of under the Structures Monitoring Program.[1]

Exception Notes

1. Inspection of MEB enclosure assemblies under the Metal-Enclosed Bus Inspection Program assures that effects of aging will be identified prior to loss of intended function.

Enhancements

None

Operating Experience

The Metal-Enclosed Bus Inspection Program at JAFNPP is a new program. Plant and industry operating experience will be considered when developing this program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. JAFNPP plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

As such, this program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extend operation. As additional operating experience is obtained, lessons learned can be used to adjust the program as needed.

Conclusion

The Metal-Enclosed Bus Inspection Program will be effective for managing aging effects since it will incorporate appropriate monitoring techniques. The Metal-Enclosed Bus Inspection Program will provide reasonable assurance that the effects of aging will be managed such that the applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.18 NON-EQ INSTRUMENTATION CIRCUITS TEST REVIEW

Program Description

The Non-EQ Instrumentation Circuits Test Review Program at JAFNPP will be comparable to the program described in NUREG-1801, Section XI.E2, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits.

Under the Non-EQ Instrumentation Circuits Test Review Program, calibration or surveillance results for non-EQ electrical cables in circuits with sensitive, high voltage, low-level signals; (i.e., neutron flux monitoring instrumentation); will be reviewed. Most neutron flux monitoring system cables and connections are calibrated as part of the instrumentation loop calibration at the normal calibration frequency, which provides sufficient indication of the need for corrective actions based on acceptance criteria related to instrumentation loop performance. The review of calibration results will be performed once every 10 years.

For neutron flux monitoring system cables that are disconnected during instrument calibrations, testing will be performed at least once every 10 years using a proven method for detecting deterioration for the insulation system (such as insulation resistance tests, or time domain reflectometry). In accordance with the corrective action program, an engineering evaluation will be performed when test acceptance criteria are not met and corrective actions, including modified inspection frequency, will be implemented to ensure that the intended functions of the cables can be maintained consistent with the current licensing basis for the period of extended operation.

The program will be fully implemented prior to the period of extended operation.

NUREG-1801 Consistency

The program will be consistent with NUREG-1801, Section XI.E2, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Non-EQ Instrumentation Circuits Test Review Program at JAFNPP is a new program. Plant and industry operating experience will be considered when developing this program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. JAFNPP plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

As such, this program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extend operation. As additional operating experience is obtained, lessons learned can be used to adjust the program as needed.

Conclusion

The Non-EQ Instrumentation Circuits Test Review Program will incorporate proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls. Implementation of the Non-EQ Instrumentation Circuits Test Review Program will provide reasonable assurance that the effects of aging will be managed so that the components within the scope of this program will perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.19 NON-EQ INSULATED CABLES AND CONNECTIONS

Program Description

The Non-EQ Insulated Cables and Connections Program at JAFNPP will be comparable to the program described in NUREG-1801, Section XI.E1, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

The Non-EQ Insulated Cables and Connections Program will provide reasonable assurance that intended functions of insulated cables and connections exposed to adverse localized environments caused by heat, radiation and moisture can be maintained consistent with the current licensing basis through the period of extended operation. An adverse localized environment is significantly more severe than the specified service condition for the insulated cable or connection.

This program addresses cables and connections at plants with configuration such that most cables and connections installed in adverse environments are accessible. This program can be thought of as a sampling program. Selected cables and connections from accessible areas, representative of all cables in adverse localized environments, will be inspected. If an unacceptable condition or situation is identified for a cable or connection in the inspection sample, a determination will be made as to whether the same condition or situation is applicable to other accessible cables or connections. The sample size will be increased based on an evaluation.

The program will be fully implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Non-EQ Insulated Cables and Connections Program at JAFNPP will be consistent with the program described in NUREG-1801, Section XI.E1, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Non-EQ Insulated Cables and Connections Program at JAFNPP is a new program. Plant and industry operating experience will be considered when developing this program. Industry operating experience that forms the basis for the program is described in the operating

experience element of the NUREG-1801 program description. JAFNPP plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

As such, this program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extend operation. As additional operating experience is obtained, lessons learned can be used to adjust the program as needed.

Conclusion

The Non-EQ Insulated Cables and Connections Program will be effective for managing aging effects since it will incorporate proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls. The Non-EQ Insulated Cables and Connections Program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.20 OIL ANALYSIS

Program Description

The Oil Analysis Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M39, Lubricating Oil Analysis.

The Oil Analysis Program maintains oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to loss of material, cracking, or fouling.

Sampling frequencies are based on vendor recommendations, accessibility during plant operation, equipment importance to plant operation, and previous test results.

NUREG-1801 Consistency

The Oil Analysis Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M39, Lubricating Oil Analysis, with an exception and enhancements.

Exceptions to NUREG-1801

The Oil Analysis Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M39, Lubricating Oil Analysis with the following exception.

Attributes Affected	Exception
3. Parameters Monitored/ Inspected	Flash point is not determined for sampled oil.[1]

Exception Note

1. Analyses of filter residue or particle count, viscosity, total acid/base (neutralization number), water content, and metals content provide sufficient information to verify the oil is suitable for continued use.

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
1. Scope of Program	The Oil Analysis Program guidance documents will be enhanced to periodically sample lubricating oil in the underground oil filled cable, the security generator, and the fire pump diesel.
3. Parameters Monitored/ Inspected	The Oil Analysis Program guidance documents will be enhanced to include viscosity and neutralization number determination of oil samples from components that do not have regular oil changes.
3. Parameters Monitored/ Inspected	The Oil Analysis Program guidance documents will be enhanced to include particulate and water content for oil replaced periodically.

Operating Experience

The HPCI lube oil sump suffered from water intrusion from March 2001 until February 2005 because valve 23MOV-14 was inadequate for steam service. During that time, monthly oil monitoring was performed and water was drained from the oil sump as necessary to keep the system as water-free as possible. Results of particle count, viscosity, and additive metal depletion analyses did not indicate any evidence of water, emulsion or contaminant carry over to the operating oil system. Recent quarterly sampling results show that water and particulates are within acceptance criteria. Continuous confirmation of oil quality and timely corrective actions provide evidence that the program is effective in managing aging effects for lube oil components.

In 2004, a few non-magnetic metallic wear particles were found on the EDG "D" lube oil filter screens. The quantity was not large enough for elemental analysis to determine material composition. EDG "D" oil sample particle counts at the time were in the normal range, indicating that particles were being captured in the 40 mesh filters and not entering the operating oil system. Corrective action was taken to schedule filter inspections during subsequent diesel maintenance activities to capture particles for analysis to determine material and possible sources. Continuous confirmation of oil quality and timely corrective actions provide evidence that the program is effective in managing aging effects for lube oil components.

Conclusion

The Oil Analysis Program has been effective at managing aging effects. The Oil Analysis Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended function consistent with the current licensing basis for the period of extended operation.

B.1.21 ONE-TIME INSPECTION

Program Description

The One-Time Inspection Program at JAFNPP is a new program that will be implemented prior to the period of extended operation. The program will be comparable to the program described in NUREG-1801, Section XI.M32, One-Time Inspection. The one-time inspection activity for small bore piping in the reactor coolant system and associated systems that form the reactor coolant pressure boundary will also be comparable to the program described in NUREG-1801, Section XI.M35, One-Time Inspection of ASME Code Class I Small-Bore Piping. The JAFNPP program will be consistent with the program elements described in NUREG-1801.

The program will include one activity to verify effectiveness of an aging management program and activities to confirm the absence of aging effects as described below.

Water chemistry control programs	One-time inspection activity will verify the effectiveness of the water chemistry control aging management programs by confirming that unacceptable cracking, loss of material, and fouling is not occurring.
Internal surfaces of high pressure coolant injection system components containing untreated air.	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.
Surfaces of carbon steel and cast iron plant drain components normally exposed to indoor air	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.
Internal surfaces of carbon steel emergency diesel generator system components containing untreated air	One-time inspection activity will confirm that cracking and loss of material are not occurring or are so insignificant that an aging management program is not warranted.
Internal surfaces of stainless steel and aluminum components in the radioactive waste system containing raw water	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.

Internal surfaces of stainless steel and copper alloy components in the raw water treatment system containing raw water	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.
Internal surfaces of copper alloy components in the plumbing, sanitary and lab system and the city water system containing raw water	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.
Internal surfaces of scram accumulators	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.
Small bore piping in the reactor coolant system and associated systems that form the reactor coolant pressure boundary	One-time inspection activity will confirm that cracking and reduction of fracture toughness are not occurring or are so insignificant that an aging management program is not warranted.
Reactor vessel flange leakoff line	One-time inspection activity will confirm that cracking is not occurring or is so insignificant that an aging management program is not warranted.
Main steam flow restrictors (CASS)	One-time inspection activity will confirm that loss of material, cracking, and reduction of fracture toughness are not occurring or are so insignificant that an aging management program is not warranted.

The elements of the program include (a) determination of the sample size based on an assessment of materials of fabrication, environment, plausible aging effects, and operating experience; (b) identification of the inspection locations in the system or component based on the aging effect; (c) determination of the examination technique, including acceptance criteria that would be effective in managing the aging effect for which the component is examined; and (d) evaluation of the need for follow-up examinations to monitor the progression of any aging degradation.

When evidence of an aging effect is revealed by a one-time inspection, routine evaluation of the inspection results will identify appropriate corrective actions.

The inspection will be performed within the 10 years prior to the period of extended operation.

NUREG-1801 Consistency

The One-Time Inspection Program will be consistent with the program described in NUREG-1801, Section XI.M32, One-Time Inspection. The one-time inspection activity for small bore piping in the reactor coolant system and associated systems that form the reactor coolant pressure boundary, will also be consistent with the program described in NUREG-1801, Section XI.M35, One-Time Inspection of ASME Code Class I Small-Bore Piping.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The One-Time Inspection Program at JAFNPP is a new program. The elements which comprise this program (e.g., the scope of the inspections and inspection techniques) are consistent with industry practice.

As such, operating experience provides reasonable assurance that implementation of the One-Time Inspection Program will manage the effects of aging such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extend operation.

Conclusion

Verification of the effectiveness of the Water Chemistry Control programs and confirmation of the absence of aging effects on specific high pressure coolant injection system, plant drain system, emergency diesel generator, radioactive waste system, raw water treatment system, plumbing, sanitary and lab system, reactor coolant system, and main steam system components will be undertaken in the One-Time Inspection Program to ensure component intended functions can be maintained in accordance with the current licensing basis (CLB) during the period of extended operation.

B.1.22 PERIODIC SURVEILLANCE AND PREVENTIVE MAINTENANCE

Program Description

There is no corresponding NUREG-1801 program.

The JAFNPP Periodic Surveillance and Preventive Maintenance Program includes periodic inspections and tests that manage aging effects not managed by other aging management programs. The preventive maintenance and surveillance testing activities are generally implemented through repetitive tasks or routine monitoring of plant operations. Credit for program activities has been taken in the aging management review of the following systems and structures.

Reactor building	Perform visual or other non-destructive examination to manage loss of material for carbon steel components within the reactor building battery racks framing, reactor building crane, rails, and girders, equipment access lock doors, and refueling platform.
Reactor building	Perform visual inspection and manually flex a representative sample of the elastomer seals for equipment lock doors at reactor track bay inner & outer doors to manage cracking and change in material properties.
Core spray system	Monitor core spray piping per the existing augmented flow accelerated corrosion program.
Automatic depressurization system	Use visual or other NDE techniques to inspect torus to manage loss of material for carbon steel piping and T-quenchers in the waterline region of the torus.
High pressure coolant injection (HPCI) system	Monitor HPCI piping per the existing augmented flow accelerated corrosion program.
Reactor core isolation cooling (RCIC) system	Monitor RCIC piping per the existing augmented flow accelerated corrosion program.

Standby gas treatment (SGT) system	Use visual or other NDE techniques to inspect a representative sample of internal surfaces of the valve bodies and piping in the demister drains and in drain piping downstream of the fans to manage loss of material. Use visual or other NDE techniques to inspect a representative sample of internal surfaces of piping and valves in the vent piping and from the stack analyzer sample chambers including loop seals. Use visual or other NDE techniques to inspect a representative sample of internal surfaces of piping downstream of the SGT fans between the drain and the outlet of the stack sump Use visual or other NDE techniques to inspect a representative sample of internal surfaces of piping, valves and flow elements in the discharge piping from the steam packing exhauster and the condenser air removal pumps to the SGT discharge piping to the stack.
Primary containment atmosphere control and dilution system	Use visual or other NDE techniques to inspect a representative sample of heat exchanger coil external surfaces on 27E-1A/B, 27NV-A/B, 27PBC-1A/B
Emergency diesel generator system	Use visual or other NDE techniques to inspect a representative sample of EDG intake air, air start, and exhaust components to manage loss of material (air start and exhaust) fouling, loss of material, cracking, and change in properties (intake air), and cracking (exhaust).

Heating, ventilation, and air conditioning (HVAC) systems	Visually inspect and manually flex a representative sample of the HVAC duct flexible connections to manage cracking and change in material properties. Use visual or other NDE techniques to inspect a representative sample of coils, housings, drip pans, and fins to manage loss of material and to manage fouling of the tubes and fins for air handling units 70AHU-3A & B, 70AHU-12A & B, 70AHU-19A, B. Test chiller performance and inspect tube external surfaces to manage loss of material and fouling for heat exchanger portions of control and relay room chillers 70RWC-2A(EVP), 70RWC-2B(EVP). Test chiller performance and inspect tube external surfaces to manage loss of material and fouling for heat exchanger portions of control and relay room chillers 70RWC-2A(CND), 70RWC-2B(CND).
Plant drains system	Use visual or other NDE techniques to inspect a representative sample of the floor drain components that provide a drain path for fire suppression water from floor drains to the floor drain collection tank or to the yard drain system to manage loss of material.
Radwaste	Use visual or other NDE techniques to inspect a representative sample of internal surfaces of X-18 and X-19 penetration components to manage loss of material.
Security generator system	Use visual or other NDE techniques to inspect a representative sample of security generator exhaust components to manage cracking and loss of material on internal surfaces. Perform security generator operability test to manage fouling for heat exchanger tubes. Use visual or other NDE techniques to inspect the surface condition of the radiator tubes to manage loss of material on external surfaces.
Nonsafety-related systems affecting safety-related systems	Use visual or other NDE techniques to inspect a representative sample of radioactive waste, circulating water, turbine closed loop cooling, raw water treatment, contaminated equipment drain, service water, turbine building ventilation, administration building ventilation and cooling, plumbing, sanitary and lab, and city water system components to manage internal loss of material.

Evaluation

1. Scope of Program

The JAFNPP Periodic Surveillance and Preventive Maintenance Program, with regard to license renewal, includes those tasks credited with managing aging effects identified in aging management reviews.

2. Preventive Actions

Inspection and testing activities used to identify component aging effects do not prevent aging effects. However, activities are intended to prevent failures of components that might be caused by aging effects.

3. Parameters Monitored/Inspected

This program provides instructions for monitoring structures, systems, and components to detect degradation. Inspection and testing activities monitor various parameters including system flow, system pressure, surface condition, loss of material, presence of corrosion products, and signs of cracking.

4. Detection of Aging Effects

Preventive maintenance activities and periodic surveillances provide for periodic component inspections and testing to detect aging effects. Inspection intervals are established such that they provide timely detection of degradation. Inspection intervals are dependent on component material and environment and take into consideration industry and plant-specific operating experience and manufacturers' recommendations. Each inspection or test occurs at least once every ten years.

The extent and schedule of inspections and testing assure detection of component degradation prior to loss of intended functions. Established techniques such as visual inspections are used.

5. Monitoring and Trending

Preventive maintenance and surveillance testing activities provide for monitoring and trending of aging degradation. Inspection and testing intervals are established such that they provide for timely detection of component degradation. Inspection and testing intervals are dependent on component material and environment and take into consideration industry and plant-specific operating experience and manufacturers' recommendations.

6. Acceptance Criteria

Periodic Surveillance and Preventive Maintenance Program acceptance criteria are defined in specific inspection and testing procedures. The procedures confirm component integrity by verifying the absence of aging effects or by comparing applicable parameters to limits based on applicable intended functions established by plant design basis.

7. Corrective Actions

Corrective actions for this program will be administered under the site QA program which meets requirements of 10 CFR Part 50, Appendix B.

8. Confirmation Process

This attribute is discussed in Section B.0.3.

9. Administrative Controls

This attribute is discussed in Section B.0.3.

10. Operating Experience

Inspection of battery racks A and B carbon steel framing in September 2004 revealed that the racks were in good condition, with no signs of corrosion. In November 2005, battery rack inspections did not note signs of corrosion. However, paint was touched up in areas where acid residue had been degrading the paint on the battery racks. Absence of aging effects provides evidence that the program is effective for managing loss of material on the battery racks.

During 2005, refueling platform carbon steel components did not exhibit significant corrosion or wear during exercise and inspection of the refuel bridge. Absence of aging effects provides evidence that the program is effective for managing loss of material on the refueling platform components.

Results of an inspection of the reactor building crane in July of 2004 did not reveal significant corrosion or wear. Absence of aging effects provides evidence that the program is effective for managing loss of material on the reactor building crane, crane rails, and girders.

Inspections of reactor building doors seals between September 2005 and April 2006 revealed one instance of a damaged door seal. A work order and a condition report were issued to repair or replace the seal. Identification of degradation and prompt corrective action provide evidence that the program is effective for managing aging effects for the door seals.

Augmented flow-accelerated corrosion program inspections in 2004 of HPCI piping susceptible to erosion revealed measured wall thicknesses greater than 87.5% of nominal wall thickness. Absence of significant wall loss provides evidence that the program is effective for managing loss of material on the HPCI piping.

Augmented flow-accelerated corrosion program inspections in 2002 of RCIC piping susceptible to erosion revealed that three of the four locations had measured wall thicknesses greater than 87.5% of nominal wall thickness. The pipe downstream of 13MOV-27 had a measured wall thickness less than 87.5% of nominal wall thickness, but was evaluated through the corrective action process and found acceptable for continued use. Identification of degradation and prompt corrective action provide evidence that the program is effective for managing loss of material on the RCIC piping.

Inspections of EDG air intake, air start, and exhaust system components in 2003 and 2005 revealed no significant corrosion, cracking, or fouling. Absence of aging effects provides evidence that the program is effective for managing aging effects for EDG components.

Eddy current inspections of the control room chiller condensers in 1998 (70RWC-2A) and 2000 (70RWC-2B) revealed no loss of material or fouling of the condenser tubes. Absence of aging effects provides evidence that the program is effective for managing aging effects for the control room chiller condensers.

In 2002, the control room chillers were the focus of an action plan due to repetitive Freon leaks and reliability problems. The primary causes for the reliability problems were a lack of maintenance personnel with sufficient knowledge of air conditioning systems and a lack of scheduled preventive maintenance. Corrective actions were taken to improve the scope and schedule of preventive maintenance and to provide training on refrigeration and air conditioning systems for maintenance personnel.

Preventive maintenance on control room chiller condenser 70RWC-2A in March 2006 revealed corrosion of the carbon steel condenser head's inlet/outlet baffle plate and the inner side of the o-ring groove. Under the corrective action program, a work order was issued to install a new condenser head it at the next available opportunity.

Eddy current testing of control room chiller condenser 70RWC-2A in March 2006 revealed that several tubes were found to be leaking at the tube sheet. The tubes are a press fit into the tube sheet. Attempts were made to roll the tubes tighter into the tube sheet, but leakage was still present in most cases. Under the corrective action program, a work order was issued to replace the tubes.

In 2000, the security generator failed its operational test by tripping on high temperature. The cause was radiator fouling. Corrective actions were taken to flush

the cooling system and revise the preventive maintenance interval from 10 years to 5 years. Confirmation of heat transfer ability and timely corrective actions provide evidence that the program is effective in managing fouling for the security generator radiator.

Security generator operational testing performed in 2005 shows that the engine coolant temperature was within acceptance criteria after the generator had been running loaded for 20 minutes. These results provide evidence that the program is effective for managing fouling of the security generator radiator.

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
1. Scope of Program 3. Parameters Monitored/Inspected 4. Detection of Aging Effects 6. Acceptance Criteria	Prior to the period of extended operation, program activity guidance documents will be enhanced as necessary to assure that the effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Conclusion

The Periodic Surveillance and Preventive Maintenance Program has been effective at managing aging effects. The Periodic Surveillance and Preventive Maintenance Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.23 REACTOR HEAD CLOSURE STUDS

Program Description

The Reactor Head Closure Studs Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M3, Reactor Head Closure Studs.

This program includes inservice inspection (ISI) in conformance with the requirements of ASME Section XI, Subsection IWB, and preventive measures (e.g. rust inhibitors, stable lubricants, appropriate materials) to mitigate cracking and loss of material of reactor head closure studs, nuts, washers, and bushings.

NUREG-1801 Consistency

The Reactor Head Closure Studs Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M3, Reactor Head Closure Studs, with one exception.

Exceptions to NUREG-1801

The Reactor Head Closure Studs Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M3, Reactor Head Closure Studs, with the following exception.

Attributes Affected	Exception
4. Detection of Aging Effects	When reactor head closure studs are removed for examination, either a surface or volumetric examination is allowed.[1]

Exception Note

1. Cracking initiates on the outside surfaces of bolts and studs. Therefore, a qualified surface examination meeting the acceptance standards of ASME Section XI, Subsection IWB-3515 provides at least the sensitivity for flaw detection that an end shot ultrasonic examination provides on bolts or studs. Thus, when reactor head closure studs are removed for examination, either a surface or volumetric examination is allowed.

Enhancements

None

Operating Experience

Volumetric examination of 30 reactor head closure studs in 1990 resulted in no recordable indications. Absence of recordable indications provides evidence that the program is effective for managing loss of material and cracking of the reactor head closure studs, nuts, and washers

Conclusion

The Reactor Head Closure Studs Program has been effective at managing aging effects. The Reactor Head Closure Studs Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.24 REACTOR VESSEL SURVEILLANCE

Program Description

The Reactor Vessel Surveillance Program complies with the guidelines for an acceptable Integrated Surveillance Program as described in NUREG-1801, Section XI.M31, Reactor Vessel Surveillance. This program manages reduction in fracture toughness of reactor vessel beltline materials to assure that the pressure boundary function of the reactor pressure vessel is maintained for the period of extended operation.

JAFNPP has applied to use the BWR vessel and internals project (BWRVIP) Integrated Surveillance Program (ISP) and expects NRC approval well before the period of extended operation. The Reactor Vessel Surveillance Program monitors changes in the fracture toughness properties of ferritic materials in the reactor pressure vessel (RPV) beltline region. As BWRVIP-ISP capsule test reports become available for RPV materials representative of JAFNPP, the actual shift in the reference temperature for nil ductility transition of the vessel material may be updated. In accordance with 10 CFR 50 Appendices G and H, JAFNPP reviews relevant test reports to assure compliance with fracture toughness requirements and P-T limits.

BWRVIP-116, "BWR Vessel and Internals Project Integrated Surveillance Program (ISP) Implementation for License Renewal," describes the design and implementation of the ISP during the period of extended operation. BWRVIP-116 identifies additional capsules, their withdrawal schedule, and contingencies to ensure that the requirements of 10 CFR 50 Appendix H are met for the period of extended operation.

NUREG-1801 Consistency

The Reactor Vessel Surveillance Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M31, Reactor Vessel Surveillance, with one enhancement.

Exceptions to NUREG-1801

None

Enhancements

The following enhancement will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancement
5. Monitoring and Trending Actions 6. Acceptance Criteria 7. Corrective Actions	The Reactor Vessel Surveillance Program will be enhanced to proceduralize the data analysis, acceptance criteria, and corrective actions described in this program description, to meet the requirements of the ISP as found in BWRVIP-86-A, 102, 116, and 135.

Operating Experience

JAFNPP has committed to the Boiling Water Reactor Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP). The fact that the plant participates in the BWRVIP ISP ensures that future OE from all participating BWRs will be factored into this program. Thus, the Reactor Vessel Surveillance Program provides reasonable assurance that the effects of aging will be managed such that the applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Conclusion

The Reactor Vessel Surveillance Program provides reasonable assurance that aging effects will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.25 SELECTIVE LEACHING

Program Description

The Selective Leaching Program at JAFNPP will be comparable to the program described in NUREG-1801, Section XI.M33 Selective Leaching of Materials.

The Selective Leaching Program will ensure the integrity of components made of cast iron, bronze, brass, and other alloys exposed to raw water, treated water, soil, or other environments that may lead to selective leaching. The program will include a one-time visual inspection and hardness measurement of selected components that may be susceptible to selective leaching to determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function for the period of extended operation.

The program will be fully implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Selective Leaching Program at JAFNPP will be consistent with the program described in NUREG-1801, Section XI.M33 Selective Leaching of Materials.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Selective Leaching Program at JAFNPP is a new program. The elements which comprise this program (e.g., the scope of the inspections and inspection techniques) are consistent with industry practice and staff expectations.

As such, operating experience provides reasonable assurance that implementation of the Selective Leaching Program will manage the effects of aging such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extend operation.

Conclusion

The Selective Leaching Program will be effective for managing aging effects since it will incorporate proven monitoring techniques, acceptance criteria, corrective actions, and

administrative controls. The Selective Leaching Program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.26 SERVICE WATER INTEGRITY

Program Description

The Service Water Integrity Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M20, Open-Cycle Cooling Water System.

This Service Water Integrity Program relies on implementation of the recommendations of GL 89-13 to ensure that the effects of aging on the service water systems (SWS) will be managed for the period of extended operation. The SWS includes the normal service water (NSW), emergency service water (ESW), and residual heat removal service water (RHRSW). The program includes component inspections for erosion, corrosion, and blockage and performance monitoring to verify the heat transfer capability of the safety-related heat exchangers cooled by SW. Chemical treatment using biocides and chlorine and periodic cleaning and flushing of redundant or infrequently used loops are the methods used to control or prevent fouling within the heat exchangers and loss of material in SW components.

NUREG-1801 Consistency

The Service Water Integrity Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M20, Open-Cycle Cooling Water System with one exception.

Exceptions to NUREG-1801

The Service Water Integrity Program at JAFNPP is consistent with the program described in NUREG-1801, Section XI.M20, Open-Cycle Cooling Water System with the following exception.

Attributes Affected	Exceptions
2. Preventive Actions	NUREG-1801 states that system components are lined or coated. Components are lined or coated only where necessary to protect the underlying metal surfaces.[1]

Exception Notes

1. NUREG-1801 states that system components are constructed of appropriate materials and lined or coated to protect the underlying metal surfaces from being exposed to aggressive cooling water environments. Not all JAFNPP system components are lined or coated. Components are lined or coated only where necessary to protect the underlying metal surfaces.

Enhancements

None

Operating Experience

During 2000 and early 2001, ESW cooled heat exchangers did not meet target flow rates due to accumulation of silt and ferrous oxide. Thermal performance testing was used to verify the ability of the coolers to perform as required under accident conditions. When testing revealed degraded thermal performance on several coolers, an action plan was developed. Corrective actions were implemented to chemically clean the ESW supply lines; clean the crescent area unit coolers; vent, drain, and flush ESW unit coolers and piping. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing fouling of SWS components.

2005 results of heat transfer capability testing of ESW cooled heat exchangers show that crescent area coolers, electric bay area coolers, and cable tunnel area coolers are capable of removing the required amount of heat. Confirmation of thermal performance provides evidence that the program is effective for managing fouling of SWS components.

2005 results of heat transfer capability testing of RHR heat exchangers (cooled by RHRSW) show that the heat exchangers are capable of removing the required amount of heat. Confirmation of thermal performance provides evidence that the program is effective for managing fouling of SWS components.

Eddy current testing of EDG jacket water coolers in 2004 (EDG-D) and 2005 (EDG-A, B, and C) identified pitting in some of the tubes, but degradation was not sufficient to require tube plugging. None of the inspected tubes were blocked by debris or deposits and the tubes appeared to be very clean. The tubesheets were in good condition and there was no evidence of degradation of the tube to tubesheet joints. Absence of degradation provides evidence that the program is effective for managing loss of material for SWS components.

Results of SWS visual and other nondestructive examinations (2000 - 2004) revealed areas of erosion and areas of corrosion on internal and external surfaces. Corrective actions included replacement of RHRSW pumps, replacement of ESW and normal service water piping components, replacement of EDG jacket water heat exchangers, and close monitoring of RHRSW and ESW pump discharge strainer housings by ultrasonic inspections with repair as needed. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing loss of material for SWS components.

A two-week ESW system assessment in February 2000 revealed weaknesses in the Service Water Integrity Program. Corrective actions were taken to re-constitute the licensing commitments associated with Generic Letter 89-13, ensure that plant procedures were updated

to reflect Generic Letter 89-13 commitments and update the program manual. Significant improvements were also made, addressing lack of program ownership, weak program maintenance and monitoring, and deficient knowledge and skills. Identification of program weakness, and subsequent corrective actions, provide evidence that the program will remain effective for managing loss of material for SWS components.

During the fall of 2005, NRC conducted an integrated inspection which included an assessment of maintenance effectiveness for the ESW system. Results confirmed that plant personnel are maintaining the ESW system, assuring that it is capable of performing its intended function. Deficiencies are identified and appropriate corrective actions are implemented.

Conclusion

The Service Water Integrity Program has been effective at managing aging effects. The Service Water Integrity Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended function consistent with the current licensing basis for the period of extended operation.

B.1.27 STRUCTURES MONITORING

The structures monitoring programs for JAFNPP include the Masonry Wall Program and the Structures Monitoring Program. These two programs are comparable to NUREG-1801, Section XI.S5, Masonry Wall, and NUREG-1801, Section XI.S6, Structures Monitoring, respectively.

The Structures Monitoring programs are discussed in the following subsections.

- Masonry Wall
- Structures Monitoring

B.1.27.1 MASONRY WALL

Program Description

The Masonry Wall Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.S5, Masonry Wall Program.

The objective of the Masonry Wall Program is to manage aging effects so that the evaluation basis established for each masonry wall within the scope of license renewal remains valid through the period of extended operation.

The program includes all masonry walls identified as performing intended functions in accordance with 10 CFR 54.4. Included components are 10 CFR 50.48-required masonry walls, radiation shielding masonry walls, and masonry walls with the potential to affect safety-related components.

Masonry walls are visually examined at a frequency selected to ensure there is no loss of intended function between inspections.

NUREG-1801 Consistency

The Masonry Wall Program is consistent with the program described in NUREG-1801, Section XI.S5, Masonry Wall Program.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Inspections in 2000 revealed that each of the two block walls separating the EDG rooms was separated slightly at the ends where they connect to the reinforced concrete walls. Inspections in 2004 revealed that the west block wall of the east electric bay and the main control room inner vestibule masonry block wall were cracked at interfaces with doors. The cracks did not affect structural integrity of the walls and were repaired by installing new grout. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing cracking of masonry walls and masonry wall joints.

A QA surveillance in August 2003 revealed no issues or findings that could impact effectiveness of the program

Conclusion

The Masonry Wall Program has been effective at managing aging effects. The Masonry Wall Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.27.2 STRUCTURES MONITORING

Program Description

The Structures Monitoring Program at JAFNPP is comparable to the program described in NUREG 1801, Section XI.S6, Structures Monitoring Program.

Structures monitoring in accordance with 10 CFR 50.65 (Maintenance Rule) is addressed in Regulatory Guide 1.160 and NUMARC 93-01. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function.

Since protective coatings are not relied upon to manage the effects of aging for structures included in the Structures Monitoring Program, the program does not address protective coating monitoring and maintenance.

NUREG-1801 Consistency

The Structures Monitoring Program is consistent with the program described in NUREG-1801, Section XI.S6, Structures Monitoring Program, with enhancements.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
1. Scope of Program	The Structures Monitoring Program procedure will be enhanced to specify that manholes, duct banks, underground fuel oil tank foundations, manway seals and gaskets, hatch seals and gaskets, underwater concrete in the intake structure, and crane rails and girders are included in the program.
4. Detection of Aging Effects	Guidance for performing structural examinations of elastomers and rubber components (seals, gaskets, seismic joint filler, and roof elastomers) to identify cracking and change in material properties (cracking when manual flexing is applied) will be added to the Structures Monitoring Program procedure.
4. Detection of Aging Effects	Guidance for performing periodic inspections to confirm the absence of aging effects for lubrite surfaces in the torus radial beam seats will be added to the Structures Monitoring Program procedure.

Operating Experience

Inspections of structural steel, concrete exposed to fluid, and structural elastomers, from 2000 through 2004, revealed signs of degradation such as cracks, gaps, corrosion (rust), and flaking coatings. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing aging effects for structural components.

In 2002, due to documentation deficiencies, inspections were not performed at the specified frequencies. Structural monitoring inspections were added to the preventive maintenance work management system to assure that future due dates are met.

Structural monitoring of concrete structures and components during 2005 revealed minor cracks that did not affect the structural integrity of the components. Monitoring of structural steel members revealed minor corrosion only. Inspection intervals were adjusted as necessary to

ensure future inspections identify degradation prior to loss of intended function. Identification of degradation and corrective action prior to loss of intended function provide evidence that the program is effective for managing aging effects for structural components.

A QA surveillance in August 2003 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The Structures Monitoring Program has been effective at managing aging effects. The Structures Monitoring Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.28 THERMAL AGING AND NEUTRON IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS)

Program Description

The Thermal Aging and Neutron Irradiation Embrittlement of CASS Program at JAFNPP will be comparable to the program described in NUREG-1801, Section XI.M13, Thermal Aging and Neutron Irradiation Embrittlement of CASS.

The purpose of the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program is to assure that reduction of fracture toughness due to thermal aging and reduction of fracture toughness due to radiation embrittlement will not result in loss of intended function. This program will evaluate CASS components in the reactor vessel internals and require non-destructive examinations as appropriate.

EPRI, the BWR Owners Group, and other industry groups are focused on reactor vessel internals to ensure a better understanding of aging effects. Future Boiling Water Reactor Vessel Internals Project (BWRVIP) reports, EPRI reports, and other industry operating experience will provide additional bases for evaluations and inspections under this program. This program will supplement reactor vessel internals inspections required by the BWR Vessel Internals Program to assure that aging effects do not result in loss of the intended functions of reactor vessel internals during the period of extended operation.

The program will be fully implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Thermal Aging and Neutron Irradiation Embrittlement of CASS Program will be consistent with the program described in NUREG-1801, Section XI.M13, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Thermal Aging and Neutron Irradiation Embrittlement of CASS Program is a new program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. JAFNPP plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

Conclusion

The Thermal Aging and Neutron Irradiation Embrittlement of CASS Program will use existing techniques with demonstrated capability and a proven industry record to provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.29 WATER CHEMISTRY CONTROL

The JAFNPP chemistry program is the personnel, programs, policies and procedures designed to control site water chemistry to maximize plant availability, extend operating lifetime, and minimize radiation levels. Based on applicable EPRI Guidelines, the program controls contaminants at lowest practical levels and provides corrosion protection for major systems and components.

The following subsections address individual JAFNPP water chemistry control programs in more detail.

- Water Chemistry Control – Auxiliary Systems
- Water Chemistry Control – BWR
- Water Chemistry Control – Closed Cooling Water

B.1.29.1 WATER CHEMISTRY CONTROL – AUXILIARY SYSTEMS

Program Description

There is no corresponding NUREG-1801 program.

The purpose of the Water Chemistry Control – Auxiliary Systems Program is to manage loss of material for components exposed to treated water.

Program activities include sampling, analysis, and replacement of coolant for control room and relay room chilled water system, security generator jacket cooling water, auxiliary boiler heating water, decay heat removal cooling water, and the stator cooling water system to minimize component exposure to aggressive environments.

Evaluation

1. Scope of Program

Program activities include sampling, analysis, and replacement of coolant for the control room and relay room chilled water system, the security generator jacket cooling water, auxiliary boiler heating water, decay heat removal cooling water, and the stator cooling water to minimize component exposure to aggressive environments.

2. Preventive Actions

This program includes monitoring and control of the control room and relay room chilled water system, the security generator jacket cooling water, auxiliary boiler heating water, decay heat removal cooling water, and the stator cooling water to minimize exposure to aggressive environments.

3. Parameters Monitored/Inspected

In accordance with industry recommendations, stator cooling water parameters monitored are conductivity, soluble copper, and dissolved oxygen.

In accordance with industry recommendations, auxiliary boiler heating water parameters monitored are conductivity, pH, and dissolved oxygen.

4. Detection of Aging Effects

The program manages loss of material for stator cooling water and decay heat removal cooling water system components, loss of material and fouling for control room and relay room chilled water system and the security generator jacket cooling water components, and loss of material and cracking of auxiliary boiler heating water components.

The One-Time Inspection Program describes inspections planned to verify the effectiveness of water chemistry control programs to ensure that significant degradation is not occurring and component intended function is maintained during the period of extended operation.

5. Monitoring and Trending

Values from analyses are archived for long-term trending and review.

6. Acceptance Criteria

In accordance with industry recommendations, acceptance criteria for the stator cooling water system are as follows.

- conductivity < 0.5 µS/cm
- dissolved oxygen ≥ 2000 ppb, ≤ 8000 ppb

In accordance with industry recommendations, acceptance criteria for the auxiliary boiler heating water are as follows.

- conductivity ≤ 30 µmhos/cm
- pH ≥ 5.5, ≤ 10.5

7. Corrective Actions

If acceptance criteria are not met, chemistry parameters are adjusted as appropriate. Additional sampling and verification is performed if necessary. Corrective actions for this program will be administered under the site QA program which meets requirements of 10 CFR Part 50, Appendix B.

8. Confirmation Process

This attribute is discussed in Section B.0.3.

9. Administrative Controls

This attribute is discussed in Section B.0.3.

10. Operating Experience

Stator cooling water conductivity, dissolved oxygen, and copper content sample results from 2000 through 2004 revealed only one instance of a parameter outside the acceptance criteria. An elevated copper reading in September of 2000 was determined to be due to rinsing of the filtration rig with nitric acid. The rig had brass fittings that leeched copper into the sample. Fittings were replaced with stainless steel and rinsing of the rig was done with demineralized water. Subsequent sample results were within acceptance criteria. Continuous confirmation of stator cooling water quality provides evidence that the program is effective in managing loss of material for stator cooling water system components.

Hot water boiler conductivity and pH sample results from 2000 through 2004 revealed no instances of a parameter outside the acceptance criteria. Continuous confirmation of hot water boiler water quality provides evidence that the program is effective in managing loss of material for auxiliary boiler heating water system components.

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Enhancements
1. Scope of Program 2. Preventive Actions 3. Parameters Monitored/Inspected 6. Acceptance Criteria	Guidance for sampling the control room and relay room chilled water, decay heat removal cooling water, and the security generator jacket cooling water will be added to the Water Chemistry Control – Auxiliary Systems Program procedures.

Conclusion

The Water Chemistry Control - Auxiliary Systems Program has been effective at managing loss of material for components exposed to treated water. The Water Chemistry Control - Auxiliary Systems Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.29.2 WATER CHEMISTRY CONTROL – BWR

Program Description

The Water Chemistry Control - BWR Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M2, Water Chemistry.

The objective of this program is to manage aging effects caused by corrosion and cracking mechanisms. The program relies on monitoring and control of water chemistry based on EPRI Report 1008192 (BWRVIP-130). BWRVIP-130 has three sets of guidelines: one for primary water, one for condensate and feedwater, and one for control rod drive (CRD) mechanism cooling water. EPRI guidelines in BWRVIP-130 also include recommendations for controlling water chemistry in the torus, condensate storage tanks, demineralized water storage tanks, and spent fuel pool.

The Water Chemistry Control – BWR Program optimizes primary water chemistry to minimize the potential for loss of material and cracking. This is accomplished by limiting the levels of contaminants in the RCS that could cause loss of material and cracking. Additionally, JAFNPP has instituted hydrogen water chemistry (HWC) and noble metal chemical addition (NMCA) to limit the potential for IGSCC through the reduction of dissolved oxygen in the treated water.

NUREG-1801 Consistency

The Water Chemistry Control - BWR Program is consistent with the program described in NUREG-1801, Section XI.M2, Water Chemistry.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

During the period from 2000 through 2004, several CRs were initiated due to adverse trends in parameters monitored by the Water Chemistry Control - BWR Program. Corrective actions were taken within the Corrective Action Program to preclude reaching unacceptable values for the parameters. Continuous confirmation of water quality and corrective action prior to reaching control limits provide evidence that the program is effective in managing loss of material for applicable components.

During the period from 2000 through 2004, a few incidents occurred in which parameters monitored by the Water Chemistry Control - BWR Program exceeded EPRI action level 1 acceptance criteria. Monitoring frequency was increased and the parameter was returned to within the prescribed normal operating range as soon as possible (within the 96 hours permitted by action level 1). Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

In August 2003, reactor water sulfates were briefly above the EPRI action level 2 acceptance criteria. The cause was flow disturbance through the condensate demineralizers that resulted in resin fines and flow channeling when they were restored to service. Corrective action was taken to remove condensate beds from service and clean them. Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

In June 2004, while the Chemistry Dept. was obtaining a sample for analysis from the standby liquid control tank (11TK-1), several small particles were seen floating inside the tank. The next month's sample showed less particulate and subsequent samples have shown none. Corrective actions included procedure modification to require sparge air sampling should particulate become evident again, to determine if this could be the source of contamination. Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

The Cycle 16 average chemistry data for primary and associated systems compares favorably when compared with the action level 1 parameter values from the BWR Water Chemistry Guidelines. Sulfate and chloride concentrations were very low, while average feedwater iron went up this cycle. Feedwater average iron and copper concentrations were affected by shutdowns and power reductions during the cycle, along with reduced condensate temperatures and ultrasonic resin cleaning skid maintenance problems. Corrective actions were taken to repair and optimize the ultrasonic resin cleaning skid and additional improvements to the condensate demineralizer system are being pursued. Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

A 2001 self-assessment revealed that sample system flow rates for the corrosion product metal samplers for feedwater and condensate may not be high enough to adequately give a representative sample. The sample lines were replaced with sample lines that deliver greater than equal to 6 linear ft./sec during 1st quarter 2004. Timely corrective action provides evidence that the program is effective in managing loss of material for applicable components.

A QA surveillance in 2004 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The Water Chemistry Control - BWR Program has been effective at managing aging effects. The Water Chemistry Control - BWR Program at JAFNPP provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.29.3 WATER CHEMISTRY CONTROL – CLOSED COOLING WATER

Program Description

The Water Chemistry Control – Closed Cooling Water Program at JAFNPP is comparable to the program described in NUREG-1801, Section XI.M21, Closed-Cycle Cooling Water System.

This program includes preventive measures that manage loss of material, cracking, and fouling for components in closed cooling water systems (jacket cooling water subsystem for the emergency diesel generator, reactor building closed loop cooling, and turbine building closed loop cooling). These chemistry activities provide for monitoring and controlling closed cooling water chemistry using JAFNPP procedures and processes based on EPRI guidance for closed cooling water chemistry.

NUREG-1801 Consistency

The Water Chemistry Control – Closed Cooling Water Program is consistent with the program described in NUREG-1801, Section XI.M21, Closed-Cycle Cooling Water System, with one exception.

Exceptions to NUREG-1801

The Water Chemistry Control – Closed Cooling Water Program is consistent with the program described in NUREG-1801, Section XI.M21, Closed-Cycle Cooling Water System, with the following exception.

Attributes Affected	Exception
3. Parameters Monitored/Trended 4. Detection of Aging Effects	The JAFNPP Water Chemistry Control – Closed Cooling Water Program does not include performance and functional testing.[1]

Exception Note

1. While NUREG-1801, Section XI.M21, Closed-Cycle Cooling Water System endorses EPRI report TR-107396 for performance and functional testing guidance, EPRI report TR-107396 does not recommend that equipment performance and functional testing be part of a water chemistry control program. This appears appropriate since monitoring pump performance parameters is of little value in managing effects of aging on long-lived, passive CCW system components. Rather, EPRI report TR-107396 states in section 5.7 (Section 8.4 in EPRI report 1007820) that performance monitoring is typically part of an engineering program, which would not be part of water chemistry. In most cases, functional and performance testing verifies that component active functions can be accomplished and as such would be included as part of Maintenance Rule (10 CFR 50.65). Passive intended functions of pumps, heat exchangers and other components will be adequately managed by the Closed Cooling Water Chemistry and One-Time Inspection programs through monitoring and control of water chemistry parameters and verification of the absence of aging effects.

Enhancements

None

Operating Experience

During the period from 2000 through 2004, several CRs were initiated due to adverse trends in parameters monitored by the Water Chemistry Control - Closed Cooling Water Program.

Corrective actions were taken within the Corrective Action Program to preclude violating acceptance criteria. Continuous confirmation of water quality and corrective action prior to reaching control limits provide evidence that the program is effective in managing loss of material for applicable components.

During the period from 2000 through 2004, a few incidents occurred in which parameters monitored by the Water Chemistry Control - Closed Cooling Water Program were outside of acceptance criteria. Monitoring frequency was increased and the parameter was returned to within the prescribed normal operating range as soon as possible. Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

The dissolved oxygen in the RBCLC system was a long term plant concern. Loss of material occurred in the RBCLC piping due to low levels of dissolved oxygen in the water. In August 2003, an oxygen injection system was added to control dissolved oxygen between 30-200 ppb. A corrosion study in 2004 showed that this control of dissolved oxygen lowered the general corrosion rate for carbon steel in RBCLC water. Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

The TBCLC system has had high dissolved oxygen concentration. High dissolved oxygen can cause pitting corrosion in carbon steel. An oxygen removal skid was installed and leaks were repaired to lower the dissolved oxygen concentration. Periodic feed and bleed operations to reduce tritium in the TBCLC system increase the dissolved oxygen, requiring use of the oxygen removal skid. A corrosion study in 2004 revealed slightly higher general corrosion rates for TBCLC carbon steel than seen in the past. Corrective actions are being implemented to ensure control of TBCLC dissolved oxygen between 30 and 200 ppb. Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

The Cycle 16 average chemistry data for the RBCLC and TBCLC systems compares favorably when compared with the action level 1 parameter values from the BWR Water Chemistry Guidelines. The dissolved oxygen in the RBCLC and TBCLC systems was better controlled this cycle with the oxygen removal skid for the TBCLC system and a new oxygen addition system for the RBCLC system. Continuous confirmation of water quality and timely corrective action provide evidence that the program is effective in managing loss of material for applicable components.

A QA surveillance in 2004 revealed no issues or findings that could impact effectiveness of the program.

Conclusion

The Water Chemistry Control - Closed Cooling Water Program has been effective at managing aging effects. The Water Chemistry Control - Closed Cooling Water Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.1.30 BOLTING INTEGRITY

Program Description

The Bolting Integrity Program relies on recommendations for a comprehensive bolting integrity program, as delineated in NUREG-1339, and industry recommendations, as delineated in the Electric Power Research Institute (EPRI) NP-5769, with the exceptions noted in NUREG-1339 for safety-related bolting. The program relies on industry recommendations for comprehensive bolting maintenance, as delineated in EPRI TR-104213 for pressure retaining bolting and structural bolting.

NUREG-1801 Consistency

The Bolting Integrity Program is consistent with the program described in NUREG-1801, Section XI.M18, Bolting Integrity Program.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be fully implemented prior to the period of extended operation.

Attributes Affected	Exception
1. Scope of Program	Procedures will be enhanced to include guidance from EPRI NP-5769 and EPRI TR-104213.
2. Preventive Actions	Procedures will be enhanced to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC and to clarify the prohibition on use of lubricants containing MoS_2 for bolting at JAFNPP.

Operating Experience

Industry operating experience that forms the basis for the Bolting Integrity program is described in the operating experience element of the NUREG-1801 program description. JAFNPP plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

As such, operating experience provides reasonable assurance that implementation of the Bolting Integrity Program will manage the effects of aging such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Conclusion

The Bolting Integrity Program will use existing techniques with demonstrated capability and a proven industry record to provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2 REFERENCES

B.2-1 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, Revision 1, U.S. Nuclear Regulatory Commission, September 2005.

B.2-2 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report,* Revision 1, U.S. Nuclear Regulatory Commission, September 2005.